CHEMICALS

IN THE ENVIRONMENT

Report on Environmental Survey
and Wildlife Monitoring of Chemicals
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Environmental Health and Safety Division

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Chapter 1.

The System of Investigation of Chemical Substances in the Environment

Chapter 1. The System of Investigation of Chemical Substances in the Environment

The Environmental Health and Safety Division of the Environment Agency of Japan has been conducting successive investigation concerning the level of chemical substances in the environment since fiscal year 1974, and is currently conducting the following 3 major investigation at present.

- Comprehensive Survey of Chemical Substances on Environmental Safety
- Investigation and Survey of Designated Chemical Substances etc.
- Follow-up Survey of the Pollution by Unintentionally Formed Chemical Substances

These surveys originate in historical terms from that the Resolution accompanying the Law Concerning the Examination and Regulation of Manufacture etc. of Chemical Substances (hereinafter referred to as the Chemical Substances Control Law) in 1973 stated that safety investigation of existing chemical substances (Approximately more than 20,000 substances which were manufactured or imported for commercial purposes at the time of enactment of the Law, listed in the Existing Chemical Substances Inventory.) should be conducted by the government. The Environment Agency initiated grasping the situation of existence of these substances in the general environment, based on this resolution. Later, substances subject to the survey were expanded to include designated chemical substances and unintentionally formed chemical substances.

(See Appendix A for the Chemical Substances Control Law)

1. Comprehensive Survey of Chemical Substances on Environmental Safety

From the First Comprehensive Survey of Chemical Substances on Environmental Safety during fiscal year 1979-1988, valuable data concerning environmental pollution by chemical substances had been accumulated and solid results had been obtained such as the application of various investigation methods for chemical substances. Moreover, many problems concerning analytical methods etc. were clarified, through the Surveys. Then, environmental pollution by dioxins which are formed unintentionally in the waste incineration process, and the possibility of ground water pollution by organochlorine compounds etc. had been pointed out. Although part of these problems had been solved by the amendment of the Chemical Substances Control Law, environmental pollution caused by new types of substances remained unresolved.

With this situation in the background, the Chemical Substances Investigation and Survey Committee consisting of experts reviewed the situation of the Surveys. New measures for problems arising from chemical substances were considered, and the Second Comprehensive Survey was conducted from fiscal year 1989 on a 10 year plan. The system of this survey is indicated in Figure 1, and the main changes from the First Survey are as follows.

a. Expansion of Substances Subject to the Survey

In addition to the existing chemical substances, new chemical substances and unintentionally formed chemical substances could be included.

Actual substances subject to the survey are chosen from these 3 categories, from the revised Priority List (listing 1,145 substances).

b. Improvement of the Method for Environmental Monitoring

From the perspective of emphasizing the effectiveness of the survey and relation between environmental media, substances subject to the survey are selected according to clusters such as organochlorine compounds, polycyclic aromatic compounds, organometallic compounds, etc.

The method for environmental monitoring which was conducted for fixed environmental media and area was changed to a flexible type i.e. choosing media and area according to the characteristic of each substance, and emphasis was laid on higher accuracy in surveys for principal substances rather than conducting surveys in wide scope.

c. Assessment of Environmental Safety

The priority list was revised considering mainly the effects of chemical substances. Chemical substances were classified according to their structure etc., and representative substances for which environmental surveys should be conducted are chosen by the estimation of environmental fate. In the assessment based on the environmental survey, exposure is assessed based on the results of environmental survey, and effect assessment is conducted based on scientific information.

Fig. 1 The System of the Second Comprehensive Survey

Chemical substances

- Existing chemical substances
- Examined new chemical substances
- Unintentionally formed chemical substances

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New Priority List (approximately 1100 substances)

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Choice in each group for approximately 110 substances / year

↓ ← Estimation of environmental fate

① Selection of substances subject to the survey (20 substances)

② Selection of substances to be regarded with special attention in the survey (5 substances)

③ Selection of media and area for survey in accordance with the characteristics of the chemical substance

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Environmental survey (for 1 year)

- Principal survey : For 5 substances to be regarded with attention among the substances subject to the survey in 3 media (water, bottom sediments and fish), and an addition of survey areas
- Environmental survey of air

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Monitoring (wildlife, water and bottom sediments)

Ecotoxicity testing

775 substances were examined through the environmental survey since 1974 fiscal year to 1998, and 307 substances were detected from the general environment. Persisting substances judged to be in need of special attention by yearly observation and Class 1

Specified Chemical Substances designated in the Chemical Substances Control Law etc., are subject to the wildlife monitoring and water and bottom sediments monitoring.

The results of environmental surveys (fiscal year 1974～1998)

	Water	Bottom sediments	Fishes	Air	Total
Surveyed substances	748	725	232	213	775
Detected substances	141	223	91	130	307
Detection ratio (%)	18.9	30.8	39.2	61.0	39.6

2. Investigation and Survey of Designated Chemical Substances

Designated Chemical Substances could be designated as Class 2 Specified Chemical Substances if the substances are judged to be harmful from the result of the toxicity test instructed according to the situation of environmental pollution by the chemicals. Class 2 Specified Chemical Substances require prior notification of the scheduled production or importation volume. If necessary, their production or importation volume is regulated.

For this purpose, the Environment Agency started the Investigation and Survey of the Designated Chemical Substances in the Environment from 1988 F.Y., in order to grasp the situation of these substances in the environment. Furthermore, from 1990 F.Y., the Study of the Exposure Route (survey concerning the quantity of chemical substances exposed to humans in daily life via each media) was newly initiated. Consequently, the name of the survey was changed to the Investigation and Survey of Designated Chemical Substances.

In "the Future of the Second General Inspection Survey (Final report)", this survey was to 'provide sufficient consideration for Designated Chemical Substances and Class 2 Specified Chemical Substances as substances subject to the survey'. Thus this survey has been conducted separately as part of the Second General Inspection Survey.

3. The Follow-Up Survey on the Pollution by Unintentionally Formed Chemical Substances

Environmental pollution caused by harmful substances which are formed unintentionally in the process of manufacture or waste incineration (e.g. dioxins) or in the natural reaction process in the environment, became a social problem. Appropriate surveys became necessary for these substances which were not directly subject to the Chemical Substances Control Law, in order to take measures.

For this reason, the existence in the environment of unintentionally formed substances which may affect human health and wildlife have been investigated since 1985 F.Y. This survey, named "the Follow-Up Survey on the Pollution by Harmful Chemical Substances, " was started in order to take preventive measures for environmental pollution by such chemical substances. Since fiscal year 1988, environmental surveys which are concluded for each year and monitoring surveys which are annually conducted have been separated.

So far, surveys have been conducted for polychlorinated dibenzo-p-dioxin (PCDD), polychlorinated dibenzofuran (PCDF), polybrominated dibenzo-p-dioxin (PBDD), polybrominated dibenzofuran (PBDF) and nitrosoamines etc.

In 1998 F.Y., a monitoring survey was conducted concerning dioxins which have been surveyed continuously since 1985 F.Y. An environmental survey was conducted for co-planar PCBs which are PCBs (polychlorinated biphenyl) with a planar structure (no chlorine substituent in the ortho position).

Since the purpose of this survey was to grasp the contamination level of unintentionally formed chemical substances, the name of the survey was revised to "the Follow-Up Survey on the Pollution by Unintentionally Formed Chemical Substances " since 1993 F.Y.

4. Outcome of Surveys Conducted So Far

The main outcome of surveys conducted so far was the amendment of the Chemical Substances Control Law in May, 1986, taking into consideration the results of the Comprehensive Survey of Chemical Substances on Environmental Safety. Organotin compounds etc. were also designated as Class 1 Specified Chemical Substances, based on the results of surveys.

Main Outcome of the Environmental Survey of Chemical Substances

Name of survey	Substance	Surveyed FY	Outcome
・Comprehensive Survey (Investigation)	Trichloroethylene Tetracloroethylene Carbon tetrachloride (solvent)	1974-1983 1974-1983 1974-1983	Amendment of the Chemical Substances Control Law in May. '86 (Initiation of Class 2 Specified Chemical Substances, Designated Chemical Substances system)
・Comprehensive Survey (Investigation) (Wildlife monitoring)	Chlordane (antitermite agent)	1981, 1982 1983-	Designation of Class 1 Specified Chemical Substances in Sep. '86
・Comprehensive Survey (Investigation) (Wildlife monitoring) ・ Investigation and Survey of Designated Chemical Substances	Tributyltin compounds (paint for bottom of ships etc.)	1983, 1984 1985- 1988-	Designation as Designated Chemical Substrances in Apr. '88 TBTO: Designation as Class 1 Specified Chemical Substances in Jan. '90 Other TBTs: Designation as Class 2 Specified Chemical Substances in Sep. '90
・Comprehensive Survey (Investigation) (Wildlife monitoring)	Triphenyltin compounds (paint for bottom of ships)	1988 1989-	Designation as Designated Chemical Substances in Jul. '88 Designation as Class 2 Specified Chemical Substances in Sep. '90
・Follow-Up Survey of the Pollution by Unintentionally Formed Chemical Substances	Dioxins (formed in the waste incineration process etc.)	1985-97	A problem of wastewater in pulp factories and in the surrounding area of waste incineration factories were raised.

Chapter 2.

Summary of the Fiscal Year 1998 General Inspection Survey of Chemical Substances on Environmental Safety

Chapter 2. Summary of the Fiscal Year 1998 General Inspection Survey of Chemical Substances on Environmental Safety

1. Purpose of the Survey

The purpose of this survey is to discover the persistence of chemical substances in the general environment at an early stage, and to grasp its concentration level.

2. Surveyed substances and areas

(1) Environmental Survey (water)

From all over Japan, water and bottom sediments were surveyed in 56 areas (Figure2-1), and fishes were surveyed in 14 areas. 24 substances(and groups) were surveyed in water and in bottom sediments and 3 in fishes. Among them, 6 substances(and groups) i.e. phenyltin compounds, diphenyltin compounds, aniline, o-chloroaniline, m-chloroaniline and p-chloroaniline were surveyed in the 56 areas. Other substances(and group) were surveyed in 12 to 15 areas.

(2) Environmental Survey (air)

11 to 17 areas (Figure 2-2) were subject to the survey and 32 substances (Table 2-2) were surveyed.

3. Sampling method and analytical method

Sampling method and analytical method are shown in Appendix C and Appendix D respectively.

4. Survey results

(1) Environmental Survey (water)

8 substances(and groups) in water, 16 in bottom sediments and 2 in fishes were detected (Table 2-1).

(2) Environmental Survey (air)

29 substances were detected (Table 2-2).

5. Summary of Each Detected Substance

(1) Water

The summary of each detected substance in water is as follows.

① Dibutyltin Compounds

1) Dibutyltin compounds are used for stabilizers for polyvinyl chloride(PVC) and copolymers of mainly PVC as well as polymer blends of PVC and modifying resins for PVC. The production volume in FY1997 was 8,351 tons(as total of organotin stabilizers).

2) In the results of the fiscal year 1983 General Environmental Survey, dibutyltin compounds were not detected in water but detected from 2 out of 25 areas in bottom sediments(3 out of 75 samples). As for FY1984, they were detected in neither water nor bottom sediments but were detected from 2 out of 46 areas in bottom sediments(6 out of 138 samples). (Detection limit : 0.08 to 10 ppb for water, 0.003 to 0.07 ppm for bottom sediments and 0.003 to 0.05 ppm for fishes)

3) In the results of this survey, dibutyltin compounds were detected from 8 out of 13 areas in water (20 out of 39 samples), 12 out of 12 areas in bottom sediments (36 out of 36 samples) and the detection range was 0.003 to 0.017 ppb in water, 0.002 to 0.27 ppm in bottom sediments (unified detection limit: 0.0021 ppb in water and 0.002 ppm in bottom sediments).

4) From the above survey results, dibutyltin compounds were detected in both water and bottom sediments and the detection frequency was so high that it is necessary to conduct more detailed survey for future and to observe the change and at the same time to endeavor to collect information.

○ Survey results of dibutyltin compounds

		(sample)	(area)	detection range	detection limit
water	FY1983	0%(0/75)	0%(0/25)	not detected	0.1 to 0.4 ppb
	FY1984	0%(0/138)	0%(0/46)	not detected	0.1 to 0.4 ppb
	FY1998	51%(20/39)	62%(8/13)	0.003 to 0.017ppb	0.0021ppb
bottom sediments	FY1983	4%(3/75)	8%(2/25)	0.02 to 0.03ppm	0.01 to 0.044ppb
	FY1984	4%(6/138)	4%(2/46)	0.004 to 0.11 ppm	0.003 to 0.07 ppm
	FY1998	100%(36/36)	100%(12/12)	0.002 to 0.27 ppm	0.002 ppm
fishes	FY1984	0%(0/138)	0%(0/42)	not detected	0.003 to 0.05 ppm

② Phenyltin Compounds

1) Phenyltin compounds are unintentionally formed by decomposition of triphenyltin compounds and some of the compounds(oxo-diphenyltin) were used in past as stabilizers for PVC.

2) In the results of the fiscal year 1989 General Environmental Survey, they were detected from 9 out of 23 areas in water(14 out of 67 samples), from 11 out of 19 areas in bottom sediments(28 out of 55 samples) and 11 out of 18 areas in fishes(28 out of 54 samples) (unified detection limits: 0.03ppb for water, 0.015 ppm for bottom sediments and 0.015 ppm for fishes).

3) In the results of this survey, phenyltin compounds were detected from 14 out of 46 areas in bottom sediments(31 out of 134 samples) and not detected in water. Detection range was 0.016 to 0.76 ppm for bottom sediments (unified detection limits: 0.01 ppb for water and 0.016 ppm for bottom sediments).

4) From the above survey results, detection frequency for phenyltin compounds tends to decline in comparison with the results of 1989 survey. In the present survey they were only detected in bottom sediments. In future it is required to conduct environmental survey at a certain interval and at the same time to endeavor to collect information.

○ Survey results of phenyltin compounds

		(sample)	(area)	detection range	detection limit
water	FY1989	21%(14/67)	39%(9/23)	0.03 to 47.3 ppb	0.03 ppb
	FY1998	0%(0/156)	0%(0/52)	not detected	0.01 ppb
bottom sediments	FY1989	51%(28/55)	58%(11/19)	0.019 to 1.1 ppm	0.015ppm
	FY1998	23%(31/134)	30%(14/46)	0.016 to 0.76ppm	0.016 ppm
fishes	FY1989	52%(28/54)	61%(11/18)	0.015 to 1.1 ppm	0.015 ppm

③ Diphenyltin Compounds

1) Diphenyltin compounds are unintentionally formed by decomposition of triphenyltin compounds and some of the compounds(oxo-diphenyltin) were used in past as stabilizers for PVC.

2) In the results of the fiscal year 1989 General Environmental Survey, they were detected from 4 out of 24 areas in water(5 out of 72 samples), from 13 out of 19 areas in bottom sediments(31 out of 53 samples) and 17 out of 20 areas in fishes(48 out of 59 samples) (unified detection limits: 0.06ppb for water, 0.005 ppm for bottom sediments and 0.005 ppm for fishes).

3) In the results of this survey, diphenyltin compounds were detected from 6 out of 45 areas in water (12 out of 133 samples) and from 30 out of 46 areas in bottom sediments (79 out of 138 samples). Detection range was 0.000037 to 0.0017 ppb for water and 0.00079 to 0.21 ppm for bottom sediments (unified detection limits: 0.0003 ppb for water and 0.00072 ppm for bottom sediments).

4) From the above survey results, diphenyltin compounds were detected in water and bottom sediments and the detection frequency for bottom sediments was high. Although the detected concentration level tends to decline as a whole, in future it is required to conduct environmental survey at a certain interval and at the same time to endeavor to collect information.

○ Survey results of diphenyltin compounds

		(sample)	(area)	detection range	detection limit
water	FY1989	7%(5/72)	17%(4/24)	0.38 to 27 ppb	0.06 ppb
	FY1998	9%(12/133)	13%(6/45)	0.00037 to 0.0017ppb	0.0003 ppb
bottom sediments	FY1989	58%(31/53)	68%(13/19)	0.007 to 0.5 ppm	0.005ppm
	FY1998	57%(79/138)	65%(30/46)	0.00079 to 0.21ppm	0.00072 ppm
fishes	FY1989	81%(48/59)	85%(17/20)	0.005 to 0.99 ppm	0.005 ppm

④ Aniline

1) Aniline is used for dyestuffs, mordants, intermediates(aniline salts, diethylanine, sulfanilic acid, acetanilid, etc.), vulcanization-accellerater for rubber, medicines, organic syntheses, raw material for gunpowder, reagent for detection of pentoses, reagent for determination of iron, chromium, lead etc.. The production volume in 1997 was 249,579 tons.

2) In the results of the fiscal year 1976 General Environmental Survey, aniline was detected from 13 out of 22 areas in water(40 out of 68 samples), 15 out of 22 areas in bottom sediments(48 out of 68 samples) (detection limits: 0.02 to 0.2 ppb for water and 0.000 8ppm for bottom sediments). And in the FY1990, from 15 out of 37 areas in water(33 out of 104 samples), from 28 out of 39 areas in bottom sediments(81 out of 116 samples) and from 10 out of 30 areas in fishes(27 out of 89 samples) (unified detection limits: 0.02 ppb for water, 0.002ppm bottom sediments and 0.001 ppm for fishes).

3) In the results of this survey, aniline was detected from 1 out of 47 areas in water(1 out of 141 samples), 36 out of 43 areas in bottom sediments(95 out of 120 samples). Detection range were 0.074ppb for water and 0.0021 to 0.21 ppm for bottom sediments (unified detection

limits: 0.06 ppb for water and 0.002 ppm for bottom sediments).

4) From the above survey results, aniline was detected from both water and bottom sediments, and the detection frequency in bottom sediments is so high that environmental survey is required to be conducted at a certain interval.

○ Survey results of aniline

		(sample)	(area)	detection range	detection limit
water	FY1976	59%(40/68)	59%(13/22)	0.02 to 28 ppb	0.02 to 0.2 ppb
	FY1990	32%(33/104)	41%(15/37)	0.02 to 0.33 ppb	0.02 ppb
	FY1998	1%(1/141)	2%(1/47)	0.0074 ppb	0.06ppb
bottom sediments	FY1976	71%(48/68)	68%(15/22)	0.0007 to 0.5ppm	0.0008 ppm
	FY1990	70%(81/116)	72%(28/39)	0.003 to 0.24 ppm	0.002 ppm
	FY1998	79%(95/120)	84%(36/43)	0.0021 to 0.21 ppm	0.002 ppm
fishes	FY1990	30%(27/89)	33%(10/30)	0.001 to 0.0077ppm	0.001 ppm

○ Results of acute toxicity tests etc. for aniline

・rat	LD50 (oral)	250 mg/kg
・mouse	LD50 (oral)	464 mg/kg
・mouse	LD50 (inhalation)	175 ppm×7 hr

・Instillation of 20mg to an eye causes medium strong irritancy and that of 100mg strong irritancy.

・Teratogenicity: No teratogenicity was found in rats at the dose showing apparent maternal toxicity.

・Tumorigenicity: In the experiments of 103 weeks administration of aniline haydrochloric acid salt added to foods, no tumorigenicity was found in Fischer 344 rats (concentration in the feed 0.3% and 0.6%), however for $B6C3F_1$ rats angiosarcoma in spleen and fibrosarcoma in spleen and several parts of bodies were produced and thus it was judged that there is tumorigenicity.

・ Mutagenicity: negative in Ames test. There are reports reporting negative in chromosomal abberation tests using Chinese hamster cultured cells, but positive at doses of 1.0, 2.0mg of aniline/ml with S9Mix. In a test for sister chromatid exchanges negative when chinese hamster cultured cells are used. And positive in a case of rat hepato- fibrocyte cultured cells without activation system. And negative in a cell transformation test using Syrian hamster cultured cells.

○ Results of ecological effect tests for aniline

・ rainbow trout	96hr LC50	36.2mg/l
・ fathead minnow	96hrLC50	32mg/l

・ Oryzias latipes	96hrLC50	4,108mg/l
・ Daphnia	96hrLC50	0.21mg/l

⑤ 4-Ethoxyaniline

1) 4-Ethoxyaniline is used as intermediates for food additives, pharmaceuticals , dyestuffs, and dyestuff intermediates. The import/production volume in 1997 was 1,000 tons(estimated).

2) In the results of the fiscal year 1977 General Environmental Survey, 4-ethoxyaniline was not detected in water and bottom sediments (detection limits: 1 to 5 ppb for water and 0.5 to 1.0 ppm for bottom sediments) and in FY 1985 not detected in water and bottom sediments (unified detection limits: 0.05 ppb for water and 0.005 ppm for bottom sediments).

3) In the results of this survey, 4-ethoxyaniline was detected from 1 out of 13 areas and 1 out of 39 samples in water and not detected in bottom sediments. Detection range for water was 0.36ppb (unified detection limit: 0.3 ppb for water and 0.02 ppb for bottom sediments).

4) From the above survey results, although 4-ethoxyaniline was detected in water, but at present it does not seem to pose any problems.

○ Survey results of 4-ethoxyaniline

		(sample)	(area)	detection range	detection limit
water	FY1977	0%(0/6)	0%(0/2)	not detected	1 to 5 ppb
	FY1985	0%(0/33)	0%(0/11)	not detected	0.05 ppb
	FY1998	3%(1/39)	8%(1/13)	0.36 ppb	0.3ppb
bottom sediments	FY1977	0%(0/6)	0%(0/2)	not detected	0.5 to 1.0 ppm
	FY1985	0%(0/33)	0%(0/11)	not detected	0.005 ppm
	FY1998	0%(0/39)	0%(0/13)	not detected	0.02 ppm

○Results of acute toxicity tests etc. for 4-ethoxyaniline

・rat	LD50 (oral)	540 mg/kg
・mouse	LD50 (oral)	530 mg/kg
・rabbit	LD50 (oral)	7,000 mg/kg
・rat	LC50 (inhalation)	250 mg/m3
・mouse	LD50 (intraperitoneal)	692 mg/kg

・In 28 days repeated dose tests using F344 rats at 0, 10, 40, 160 mg/kg/day doses, followings were observed and NOEL is judged to be 10 mg/kg/day: increase in urobilinogen in urine and reduction in numbers of red blood cells and increase in net shape red blood cells both for male and female group of 40, 160 mg/kg doses; methemoglobineemia for male and female groups of 160 mg/kg dose; increase of spleen weight for male and female groups of 40, 160 mg/kg doses; histopathologically, deposition of hemosiderin, increase in extramedullary hematopoiesis, and congestion; additionally, rise in hematopoiesis, slight deposition of hemosiderin on liver and rise in extramedullary hematopoiesis.

・Reproductive toxicity: In a reproduction/developmental toxicity screening test (OECD test guideline) using SD rats at 0, 3, 12, 50, 200 doses, significant decrease in fertility rate and effects on development of newborns for 200 mg/kg group. The NOEL on male reproduction is considered to be 200 mg/kg/day and NOEL for female and child animals 50 mg/kg/day.

・Mutagenicity: negative in Ames test but positive in chromosomal abberation test (in vitro, CHL cells) and micronucleus test.

○ Results of ecological effect tests for 4-ethoxyaniline

・ Selenastrum capricornutum	72hr EC50 (growth inhibition)	5.1 ppm
・ Daphnia magna	24hr EC50 (immobilization)	170 ppm
	21days NOEC(proliferation inhibition)	0.19 ppm
・ Oryzias latipes	96hr LC50	240 ppm(w/v)

⑥ o-Chloroaniline

1) o-Chloroaniline is known as Fast Yellow G Base and is used for intermediates for naphthol dyes, a raw material of 3-hydroxy-diphenylene oxide etc., intermediates for pharmaceuticals and agricultural chemicals, and a cross-linking agent. The importation/production volume in 1997 was 500 tons (estimated).

2) In the results of fiscal year 1976 General Environmental Survey, o-chloroaniline was not detected in fishes and detected from 5 out of 38 areas in water (12 out of 120 samples) and from 12 out of 39 areas in bottom sediments (29 out of 113 samples) (detection limits: 0.02 to 100 ppb for water, 0.0003 to 1.0 ppm for bottom sediments and 1.0 ppm for fishes).
In the results of FY 1990 General Environmental Survey, it was detected from 4 out of 26 areas (7 out of 78 samples) in water and from 10 out of 22 areas (25 out of 64 samples) in bottom sediments and from 1 out of 24 areas (2 out of 72 samples) (Unified detection limits:0.02 ppb for water, 0.003 ppm for bottom sediments and 0.001 ppm for fishes).

3) In the results of this survey, o-chloroaniline was detected from 7 out of 45 areas (17 out of 133 samples) in bottom sediments and not detected in water. Detection range was 0.0051 to 0.056 ppm for bottom sediments (unified detection limit: 0.09 ppb for water and 0.005 ppm for bottom sediments).

4) From the above survey results, although o-chloroaniline was detected in bottom sediments, the detected frequencies were low, so it does not seem to pose any problems at present. But for environmental effects, it is necessary to continue to collect more detailed information. (This evaluation on environmental effects was derived from the fact that PNEC for aquatic organisms is 0.0003 mg/l.)

○ Survey results of o-chloroaniline

		(sample)	(area)	detection range	detection limit
water	FY1976	10%(12/120)	13%(5/38)	0.028 to 0.35ppb	0.02 to 100 ppb
	FY1990	9%(7/78)	15%(4/26)	0.02 to 0.56 ppb	0.02 ppb
	FY1998	0%(0/144)	0%(0/48)	not detected	0.09 ppb
bottom sediments	FY1976	26%(29/113)	31%(12/39)	0.0007 to 0.098ppm	0.003 to 1.0 ppm
	FY1990	39%(25/64)	45%(10/22)	0.0032 to0.028ppm	0.003 ppm
	FY1998	13%(17/133)	16%(7/45)	0.0051 to 0.056ppm	0.005 ppm
fishes	FY1976	0%(0/2)	0%(0/1)	not detected	1.0 ppm
	FY1990	3%(2/72)	0%(1/24)	0.0012 to 0.0025ppm	0.001 ppm

○Results of acute toxicity tests etc. for o-chloroaniline

・rat	LD50(oral)	256mg/kg
・cat	LD50(subcutaneous)	310mg/kg

・Gives damage to kidney and liver. In a single dose test on rats at intraperitoneal administration of 50 to 190 mg/kg, such renal damage as rise of BUN in serum was observed.

・Mutagenicity: Negative on a cell transformation test using Syrian hamster derived cells.

○ Results of ecological effect tests for o-chloroaniline

・ Chlorella pyrenoidosa	96hr EC50 (growth inhibition)	32 mg/l
・ Scenedesmus subspicatus	72hr EC50 (growth inhibition)	40 mg/l
・ Daphnia magna	48hr LC50	0.13mg/l
	24hr EC50 (immobilization)	6.0 mg/l
	21days NOEC(proliferation inhibition)	0.032 mg/l
・ Poecilia reticulata	14days LC50	6.30 mg/l
・ fathead minnow	96hr LC50	5.65 mg/l

⑦ m-Chloroaniline

1) In the fiscal year 1976 General Environmental Survey, m-chloroaniline was not detected in fishes and was detected from 4 out of 40 areas (10 out of 128 samples) in water and from 12 out of 41 areas (34 out of 121 samples) in bottom sediments (detection limit: 0.04

to 100 ppb for water, 0.0001 to 1.2 ppm and 1.0 ppm for fishes). In FY1990, it was not detected in fishes and was detected from 2 out of 15 areas (3 out of 45 samples) in water and from 10 out of 15 areas (24 out of 43 samples) in bottom sediments (unified detection limit: 0.02 ppb for water, 0.003 ppm for bottom sediments and 0.002 ppm for fishes).

2) In the results of this survey, m-chloroaniline was detected from 5 out of 44 areas (11 out of 130 samples) in bottom sediments and not detected in water. Detection range was 0.0046 to 0.022 ppm for bottom sediments. (unified detection limit:0.11 ppb for water and 0.0045 ppm for bottom sediments).

3) From the above survey results, although m-chloroaniline was detected in bottom sediments, the detection frequencies in bottom sediments was low, so it does not seem to pose any problems at present. But for ecological effects it is required to continue to collect more detailed information. This evaluation on ecological effects was derived from the fact that PNEC for aquatic organisms is 0.001 mg/l.

○ Survey results of m-chloroaniline

		(sample)	(area)	detection range	detection limit
water	FY1976	8%(10/128)	10%(4/40)	0.013 to 0.34ppb	0.04 to 100 ppb
	FY1990	7%(3/45)	13%(2/15)	0.029 to 0.06 ppb	0.02 ppb
	FY1998	0%(0/153)	0%(0/51)	not detected	0.11 ppb
bottom sediments	FY1976	28%(34/121)	29%(12/41)	0.0003 to 0.067ppm	0.0001 to 1.2ppm
	FY1990	56%(24/43)	67%(10/15)	0.003 to 0.043ppm	0.003 ppm
	FY1998	8%(11/130)	11%(5/44)	0.0046 to 0.022ppm	0.0045 ppm
fishes	FY1976	0%(0/2)	0%(0/1)	not detected	1.0 ppm
	FY1990	0%(0/51)	0%(0/18)	not detected	0.002 ppm

○Results of acute toxicity tests etc. for m-chloroaniline

・ rat	LD50 (oral)	256 mg/kg
・ mouse	LD50 (oral)	334 mg/kg
・ rat	LC50 (inhalation)	150 ppm/4 hr
・ mouse	LC50 (inhalation)	550 mg/m3/4 hr
	LD50 (intraperitoneal)	200 mg/kg

○ Results of ecological effect tests for m-chloroaniline

・ Chlorella pyrenoidosa	96hr EC50 (growth inhibition)	21.0 mg/l
・ Scenedesmus subspicatus	48hr EC50 (growth inhibition)	26.1 mg/l
・ Daphnia magna	48hr EC50 (immobilization)	0.35mg/l
	48hr LC50	0.10 mg/l

	21days EC50(proliferation inhibition)	0.013 mg/l
・ Brachyodanio rerio	28days LC50	6.8 mg/l
	21days NOEC (proliferation)	5.6mg/l

⑧ p-Chloroaniline

1) p-chloroaniline is used for dyestuff intermediates.

2) In the fiscal year 1976 General Environmental Survey, p-chloroaniline was not detected in fishes and was detected from 5 out of 40 areas (9 out of 128 samples) in water and from 12 out of 41 areas (39 out of 121 samples) in bottom sediments (detection limit: 0.02 to 100 ppb for water, 0.0005 to 1.2 ppm for bottom sediments and 1.0 ppm for fishes). In FY 1990, it was not detected in both water and fishes and was detected from 7 out of 15 areas (15 out of 42 samples) in bottom sediments (unified detection limit: 0.05 ppb for water, 0.008 ppm for bottom sediments and 0.005 ppm for fishes).

3) In the results of this survey, p-chloroaniline was detected from 9 out of 45 areas (24 out of 135 samples) in bottom sediments and not detected in water. Detection range was 0.0053 to 0.020 ppm for bottom sediments. (unified detection limit:0.07 ppb for water and 0.0053 ppm for bottom sediments)

4) From the above survey results, although p-chloroaniline was detected in bottom sediments, the detection frequency was not so high. So that it does not seem to pose any problem at present. But for ecological effects it is required to continue to collect more detailed information. This evaluation on ecological effects was derived from the fact that PNEC for aquatic organisms is 0.0001 mg/l.

○ Survey results of p-chloroaniline

		(sample)	(area)	detection range	detection limit
water	FY1976	7%(9/128)	13%(5/40)	0.024 to 0.39ppb	0.02 to 100 ppb
	FY1990	0%(0/54)	0%(0/18)	not detected	0.05ppb
	FY1998	0%(0/135)	0%(0/45)	not detected	0.07 ppb
bottom sediments	FY1976	32%(39/121)	29%(12/41)	0.001 to 0.27ppm	0.0005 to 1.2ppm
	FY1990	36%(15/42)	47%(7/15)	0.0089 to0.05ppm	0.008 ppm
	FY1998	18%(24/135)	20%(9/45)	0.0053 to 0.020ppm	0.005 ppm
fishes	FY1976	0%(0/2)	0%(0/1)	not detected	1.0 ppm
	FY1990	0%(0/57)	0%(0/19)	not detected	0.005 ppm

○Results of acute toxicity tests etc. for p-chloroaniline

・ rat	LD50 (oral)	300 mg/kg
・ mouse	LD50 (oral)	100 mg/kg
・ rat	LD50 (intraperitoneal)	420 mg/kg
・ mouse	LD50 (intraperitoneal)	200 mg/kg

・ Forms methemoglobins. In a single dose test on rats at intraperitoneal administration of 191 mg/kg, renal damage was observed.

・Mutagenicity: Negative on a cell transformation test using Syrian hamster derived cells.

○ Results of ecological effect tests for p-chloroaniline

・ Chlorella pyrenoidosa	96hr EC50 (growth inhibition)	4.1 mg/l
・ Scenedesmus subspicatus	48hr EC50 (growth inhibition)	2.2 mg/l
・ Daphnia magna	48hr EC50 (immobilization)	0.31mg/l
	21days NOEC(proliferation inhibition)	0.010 mg/l
・ Lepomis machrochirus	96hr LC50	2.4 mg/l
・ Brachyodanio rerio	56days NOEC (growth)	0.2mg/l

⑨ 2,4-Dichloroaniline

1) In the fiscal year 1976 General Environmental Survey, 2,4-dichloroaniline was detected from 4 out of 24 areas (7 out of 68 samples) in water and from 7 out of 22 areas (12 out of 68 samples) in bottom sediments (detection limit: 0.02 to 0.3 ppb for water and 0.0005 to 0.001 ppm for bottom sediments).

2) In the results of this survey, 2,4-dichloroaniline was not detected in both water and bottom sediments (unified detection limit:0.07 ppb for water and 0.008 ppm for bottom sediments).

3) From the above survey results, it does not seem to pose any problems at present.

○ Survey results of 2,4-dichloroaniline

		(sample)	(area)	detection range	detection limit
water	FY1976	10%(7/68)	17%(4/24)	0.032 to 0.53ppb	0.02 to 0.3 ppb
	FY1998	0%(0/39)	0%(0/13)	not detected	0.07 ppb
bottom sediments	FY1976	18%(12/68)	32%(7/22)	0.0005 to 0.034ppm	0.0005 to 0.001ppm
	FY1998	0%(0/36)	0%(0/12)	not detected	0.008 ppm

○Results of acute toxicity tests etc. for 2,4-dichloroaniline

・ rat	LD50 (oral)	1,600 mg/kg
・ mouse	LD50 (oral)	400 mg/kg

・ rat LD50 (intraperitoneal) 400 mg/kg
・ mouse LD50 (intraperitoneal) 400 mg/kg

○ Results of ecological effect tests for 2,4-dichloroaniline

・ Anacystis aeruginosa	96hr EC50 (growth)	0.96 mg/l
・ Chlorella pyrenoidosa	96hr EC50 (growth)	10.0 mg/l
・ Daphnia magna	48hr EC50 (immobilization)	1.3 mg/l
	48hr LC50	0.50 mg/l
	16days NOEC(growth)	0.015 mg/l
・ Brachyodanio rerio	96hr LC50	9.0mg/l
・ Gasterosteus aculeatus	96hr LC50	9.3 mg/l
	35days NOEC (lethal)	0.58 mg/l
・ Oryzias latipes	7days LC50	1.0 mg/l

⑩ 2,5-Dichloroaniline

1) 2,5-Dichloroaniline is used for intermediates for paints and pigments. The importation/production volume in 1997 was 200 tons (estimated).

2) In the fiscal year 1984 General Environmental Survey, 2,5-dichloroaniline was not detected in water and was detected from 1 out of 6 areas (1 out of 18 samples) in bottom sediments. (detection limit: 0.05 to 0.1 ppb for water and 0.0006 to 0.012 ppm for bottom sediments)

3) In the results of this survey, 2,5-dichloroaniline was detected from 1 out of 12 areas (1 out of 36 samples) in bottom sediments and not detected in water. The detected figure was 0.010 ppm in bottom sediments (unified detection limit:0.07 ppb for water and 0.005 ppm for bottom sediments).

4) From the above survey results, although 2,5-dichloroaniline was detected in bottom sediments, the detection frequency in bottom sediments was so low that it does not seem to pose any problems at the moment. However, for ecological effects, it is required to continue to collect more detailed information. (This evaluation on ecological effects was derived from information on ecotoxicology.)

○ Survey results of 2,5-dichloroaniline

		(sample)	(area)	detection range	detection limit
water	FY1984	0%(0/18)	0%(0/6)	not detected	0.05 to 0.1 ppb
	FY1998	0%(0/39)	0%(0/13)	not detected	0.07 ppb

bottom sediments	FY1984	6%(1/18)	17%(1/6)	0.0006ppm	0.0006 to 0.012ppm
	FY1998	3%(1/36)	8%(0/12)	0.010 ppm	0.005 ppm

○Results of acute toxicity tests etc. for 2,5-dichloroaniline

・ rat	LD50 (oral)	1,600 mg/kg
・ mouse	LD50 (oral)	1,600 mg/kg
・ rabbit	LD50 (oral)	3,750 mg/kg
・ mouse	LD50 (intraperitoneal)	400 mg/kg

○ Results of ecological effect tests for 2,5-dichloroaniline

・ Chlorella pyrenoidosa	96hr EC50 (growth inhibition)	10.0 mg/l
・ Daphnia magna	48hr LC50	2.92 mg/l
・ Poecilia reticulata	14days LC50	1.7 mg/l
・ Oncorhynchus kisutch, silver salmon	24hr LC50	1.0 to 10.0mg/l

⑪ 3,4-Dichloroaniline

1) 3,4-Dichloroaniline is used for intermediates for dyestuffs and agricultural chemicals. The importation/production volume in 1997 was 500 tons (estimated).

2) In the fiscal year 1976 General Environmental Survey, 3,4-dichloroaniline was detected from 2 out of 24 areas (4 out of 68 samples) in water and from 10 out of 22 areas (31 out of 68 samples) in bottom sediments. (detection limit: 0.04 to 0.3 ppb for water and 0.0008 to 0.003 ppm for bottom sediments) And in FY 1984, it was not detected in water and was detected from 1 out of 6 areas (1 out of 18 samples) in bottom sediments (detection limit: 0.03 to 0.1 ppb for water and 0.0003 to 0.012 ppm for bottom sediments).

3) In the results of this survey, 3,4-dichloroaniline was detected from 2 out of 13 areas (4 out of 39 samples) in bottom sediments and not detected in water. Detection range was 0.012 to 0.015 ppm in bottom sediments (unified detection limit:0.09 ppb for water and 0.01 ppm for bottom sediments).

4) From the above survey results, although 3,4-dichloroaniline was detected in bottom sediments, the detection frequency in bottom sediments was so low that it does not seem to pose any problems at the moment. However, for ecological effects, it is required to continue to collect more detailed information. (This evaluation on ecological effects was derived from the data that PNEC for aquatic organism is 0.00002 mg/l.)

○ Survey results of 3,4-dichloroaniline

		(sample)	(area)	detection range	detection limit
water	FY1976	6%(4/68)	8%(2/24)	0.24 to 0.42 ppb	0.04 to 0.3 ppb
	FY1984	0%(0/18)	0%(0/6)	not detected	0.03 to 0.1 ppb
	FY1998	0%(0/39)	0%(0/13)	not detected	0.09 ppb
bottom sediments	FY1976	46%(31/68)	45%(10/22)	0.0045 to 0.11ppm	0.0008 to 0.003ppm
	FY1984	6%(1/18)	17%(1/6)	0.0016ppm	0.0003 to 0.012ppm
	FY1998	10%(4/39)	15%(2/13)	0.012 to 0.015ppm	0.01 ppm

○Results of acute toxicity tests etc. for 3,4-dichloroaniline

・ rat	LD50 (oral)	545 mg/kg
・ mouse	LD50 (oral)	740 mg/kg
・ rat	LD50 (intraperitoneal)	280 mg/kg
・ mouse	LD50 (intraperitoneal)	310 mg/kg
・ rat	LC50 (inhalation)	65 mg/m3/4hr

○ Results of ecological effect tests for 3,4-dichloroaniline

・ Scenedesmus subspicautus	72hr EC50 (growth)	15 mg/l
	72hr NOEC (growth)	0.5 mg/l
・ Chlamydomonas reinhardtii	96hr NOEC (growth)	0.26 mg/l
・ Daphnia magna	14days NOEC (proliferation effect)	0.0025 mg/l
・ Artemia salina	28days LC50	0.03 mg/l
・ Aedes aegypti	24hr LC50	0.012 mg/l
	96hr LC50	0.005 mg/l
・ Brachdanio rerio	24hr LC50	10.7 mg/l
	96hr LC50	8.5 mg/l
	42days LC50 (growth)	0.002 to 0.1 mg/l
・ Poecilia reticulata	98days LOEC (proliferation)	2.3 mg/l

⑫ o-Toluidine

1) o-Toluidine is used for azo-, sulfurdyes, pigment raw materials, organic syntheses and solvents. The importation volume in 1997 was 599 tons.

2) In the results of the fiscal year 1976 General Environmental Survey, o-toluidine was detected from 4 out of 22 areas (8 out of 68 samples) in water and from 11 out of 22 areas (27 out of 68 samples) in bottoms sediments (detection limit: 0.1 to 0.6 ppb for water and 0.002 to 0.012 ppm for bottom sediments).

3) In the results of this survey, o-toluidine was detected from 3 out of 12 (7 out of 36

samples) in bottom sediments and was not detected in water. The detection range was 0.054 to 0.074 ppm for bottom sediments (unified detection limit: 0.08 ppb for water and 0.0043 ppm for bottom sediments).

4) From the above survey results, although o-toluidine was detected in bottom sediments, in view of the detection frequency and concentration level, it does not seem to pose any problems at present.

○ Survey results of o-toluidine

		(sample)	(area)	detection range	detection limit
water	FY1976	12%(8/68)	18%(4/22)	0.14 to 20 ppb	0.1 to 0.6 ppb
	FY1998	0%(0/39)	0%(0/13)	not detected	0.08 ppb
bottom sediments	FY1976	40%(27/68)	50%(11/22)	0.002 to 0.013ppm	0.002 to 0.012ppm
	FY1998	19%(7/36)	25%(3/12)	0.0054 to 0.00074ppm	0.0043 ppm

○Results of acute toxicity tests etc. for o-toluidine

・ human	TCLo (inhalation)	25 mg/m3
・ rat	LC50 (inhalation)	862 ppm/4hr
	LD50 (oral)	670 mg/kg
・ mouse	LD50 (oral)	520 mg/kg
・ rabbit	LD50 (oral)	840 mg/kg
・ mouse	LD50 (intraperitoneal)	150 mg/kg

・ Toluidine is capable of of formation of methemoglobin and the systemic symptom is similar to poisoning caused by aniline. Although anemia appears, hematuria is to be noted as a specific clinical symptom.

・ Case history: A tank truck fell down into a paddy field and during the lifting operation two workers were poisoned by o-toluidine leaked and went into breathing difficulty, hyperhidrosis, cyanosis symptom and hematuria.

○ Results of ecological effect tests for o-toluidine

・ Chlorella pyrenoidosa	96hr EC50 (growth inhibition)	55.0 mg/l
・ Scenedesmus quadricauda	7days EC50 (growth inhibition)	6.3mg/l
・ Daphnia magna	24hr LC50	26.0 mg/l
	21days LC50	2.2 mg/l
	21days REP(Proliferation effects)	0.1 mg/l
・ Poecilia reticulata	14days LC50	81.3 mg/l
・ Cyprinodontidae, Killifish	48hr LC50	100 mg/l

⑬ m-Toluidine

1) In the results of the fiscal year 1976 General Environmental Survey, m-toluidine was detected from 3 out of 22 areas (4 out of 68 samples) in water and from 12 out of 22 areas (32 out of 68 samples) in bottoms sediments (detection limit: 0.08 to 0.2 ppb for water and 0.001 to 0.004 ppm for bottom sediments).

2) In the results of this survey, m-toluidine was not detected in water and bottom sediments (unified detection limit: 0.2 ppb for water and 0.01 ppm for bottom sediments).

3) From the above survey results, in consideration of the envisaged concentration level, it does not seem to pose any problems at present.

○ Survey results of m-toluidine

		(sample)	(area)	detection range	detection limit
water	FY1976	6%(4/68)	14%(3/22)	0.096 to 0.26 ppb	0.08 to 0.2 ppb
	FY1998	0%(0/39)	0%(0/13)	not detected	0.2 ppb
bottom sediments	FY1976	47%(32/68)	55%(12/22)	0.002 to 0.056ppb	0.001 to 0.004ppm
	FY1998	0%(0/39)	0%(0/13)	not detected	0.01 ppm

○Results of acute toxicity tests etc. for m-toluidine

・ rat	LD50 (oral)	450 mg/kg
・ mouse	LD50 (oral)	740 mg/kg
・ rabbit	LD50 (oral)	750 mg/kg
・ mouse	LD50 (intraperitoneal)	116 mg/kg

・ Toluidine is capable of of formation of methemoglobin and the systemic symptom is similar to poisoning caused by aniline. Although anemia appears, hematuria is to be noted as a specific clinical symptom.

○ Results of ecological effect tests for m-toluidine

・ Scenedesmus quadricauda	96hr EC50 (growth inhibition)	10.0mg/l
・ Daphnia magna	48hr LC50	0.73 mg/l
	16days EC50 (proliferation)	0.043 mg/l

⑭ p-Toluidine

1) p-Toluidine is used for a raw material for organic syntheses and a special solvent for dyestuff manufacturing.

2) In the results of the fiscal year 1976 General Environmental Survey, p-toluidine was

detected from 6 out of 22 areas (11 out of 68 samples) in water and from 14 out of 22 areas (35 out of 68 samples) in bottoms sediments (detection limit: 0.02 to 0.2 ppb for water and 0.0004 to 0.0008 ppm for bottom sediments).

3) In the results of this survey, p-toluidine was not detected in water and bottom sediments (unified detection limit: 0.09 ppb for water and 0.007 ppm for bottom sediments).

4) From the above survey results, in consideration of the envisaged concentration level, it does not seem to pose any problems at present.

○ Survey results of p-toluidine

		(sample)	(area)	detection range	detection limit
water	FY1976	16%(11/68)	27%(6/22)	0.032 to 0.18 ppb	0.02 to 0.2 ppb
	FY1998	0%(0/39)	0%(0/13)	not detected	0.09 ppb
bottom sediments	FY1976	51%(35/68)	64%(14/22)	0.0007 to 0.090ppb	0.0004 to 0.0008ppm
	FY1998	0%(0/36)	0%(0/12)	not detected	0.007 ppm

○Results of acute toxicity tests etc. for p-toluidine

・ rat	LD50 (oral)	336 mg/kg
	LD50 (inhalation)	>640 mg/m3/1hr
・ mouse	LD50 (oral)	330 mg/kg
・ rabbit	LD50 (oral)	270 mg/kg
・ mouse	LD50 (intraperitoneal)	50 mg/kg

・ Toluidine is capable of of formation of methemoglobin and the systemic symptom is similar to poisoning caused by aniline. Although anemia appears, hematuria is to be noted as a specific clinical symptom.

○ Results of ecological effect tests for p-toluidine

・ Selenastrum capricornutum	14days EC50 (growth inhibition)	0.20mg/l
・ Scenedesmus quadricauda	96hr EC50 (growth inhibition)	8.0mg/l
・ Oryzias latipes	24hr LC50	60.0 mg/l
	48hr LC50	42.0 mg/l

⑮ Acrylamide

1) Acrylamide is used for flocculants, soil conditioners, modification and resin processing of textiles, paper strength resins, adhesives, paints, raw materials for oil recovering agents, sizing agents, drilling mud additives and cement slurry additives. The importation/production volume in 1997 was 56,500 tons.

2) In the results of the fiscal year 1975 General Environmental Survey, acrylamide was not detected in water (detection limit: 1 ppm). In FY1991 it was not detected in fishes and detected from 5 out of 51 areas (11 out of 153 samples) in water and from 7 out of 50 areas (20 out of 150 samples) in bottom sediments (unified detection limit: 0.05 ppb for water, 0.0005 ppm for bottom sediments and 0.0013 ppm for fishes).

3) In the results of this survey, acrylamide was not detected in water and in bottom sediments (unified detection limit: 0.15 ppb for water and 0.009 ppm for bottom sediments).

3) From the above survey results, in consideration of the enviaged concentration, it is required to improve the analytical method and to resume the environmental survey.

○ Survey results of acrylamide

		(sample)	(area)	detection range	detection limit
water	FY1975	0%(0/95)	0%(0/19)	not detected	1 ppb
	FY1991	7%(11/153)	10%(5/51)	0.05 to 0.1 ppb	0.05 ppb
	FY1998	0%(0/33)	0%(0/11)	not detected	0.15 ppb
bottom sediments	FY1991	13%(20/150)	14%(7/50)	0.00052 to 0.003ppb	0.0005 ppm
	FY1998	0%(0/30)	0%(0/10)	not detected	0.009 ppm
fishes	FY1991	0%(0/147)	0%(0/49)	not detected	0.0013 ppm

○ Results of acute toxicity tests etc. for acrylamide

・ rat	LD50 (oral)	124 mg/kg
・ mouse	LD50 (oral)	107 mg/kg
・ rabbit	LD50 (oral)	150 mg/kg
・ mouse	LD50 (intraperitoneal)	170 mg/kg
・ rat	LD50 (intraperitoneal)	90 mg/kg

・ Acrylamide is locally irritant and causes dermatitis by exposure of human with 1% aq. solution.

・ Teratogenicity: In an experiment where pregnant mice are exposed with acrylamid, no teratogenicity was observed but at the dose of 45 mg/kg/day developmental disturbances in mother animals and fetuses were observed.

・ Tumorigenicity: Dermal administration of acrylamid gives sencar mice squamous cell carcinoma. And oral and intraperitoneal administration gives A/J mice adenoma in lung. Carcinogenicity was confirmed for ICR-Swiss mice.

・ Mutagenicity: Negative in an Ames test. Positive in a mouse bone-marrow chromosomal abberation test. Positive in a micronucleus test. Positive for eukariyotic cells and negative for prokaryotic cells.

・ Case histories: According to Fujita et al. dysesthesia at terminal four limbs, difficulty in walking due to cataplexy in four limbs, lowering in grip strength, disappearance or lowering of tendon reflex, slight abnormality in electromyogram were observed but no abnormality in central nerve system. As subjective symptoms, languor in feet, palsy in fingers, languor in whole body, twist in tongue etc. are appealed in high rate.

Disorder in skin does not accompany irritating symptom and leucoderma is first formed followed by swelling of keratin and then after desquamation or exfoliation. In a case reported by Takahashi et al., disappearance of deep sensation reflex, lowering of sense and vibrational sense and abnormality in electromyogram were observed, and abnormality in electroencephalogram was observed especially for employees of long years service.

According to a study on 71 workers exposed to acrylamide, cataplexy in four limbs was the first symptom and 73% were found to be neurophysiologically abnormal. In an epidemiological study on a cohort of 8,854 humans, it was not recognaized that acrylamide causes specific cancers more frequently.

○ Results of ecological effect tests for acrylamide

・ Daphnia magna	24hr LC50	230 mg/l
	48hr LC50	230 mg/l
	21days NOEC	60 mg/l
・ Oncorhynchus mykiss	24hr LC50	>300 mg/l
	48hr LC50	210 mg/l
	72hr LC50	170 mg/l
	96hr LC50	162 mg/l

⑯ Pyridine

1) Pyridine is used for a basic solvent in rubber/paint industries, industrial raw materials , denaturalization of ethanol, analytical reagents, pharmaceuticals (sulfonamides, antihistamines, sedatives), solvents and reaction media for anhydrous metal salts, surfactants, and vulcanization accelerators. The production volume in 1997 was 4,000 tons (estimated).

2) In the results of the fiscal year 1980 General Environmental Survey, pyridine was detected from 1 out of 3 areas (2 out of 9 samples) in water and from 2 out of 3 areas (6 out of 9 samples) in bottom sediments (detection limit: 0.1 to 0.2 ppb for water and 0.002 to 0.01 ppm for bottom sediments). And in FY1991, it was detected from 2 out of 12 areas (6 out of 36 samples) in water and from 6 out of 13 areas (18 out of 39 samples) in bottom sediments and from 7 out of 13 areas (19 out of 39 samples) in fishes (unified detection limit: 0.1 ppb for water, 0.005 ppm for bottom sediments and 0.003 ppm for fishes).

3) In the results of this survey, pyridine was detected from 2 out of 11 areas (6 out of 33 samples) in water and from 2 out of 11 areas (6 out of 33 samples) in bottom sediments. The detection range was 0.29 to 0.41 ppb for water and 0.013 to 0.019 ppm for bottom sediments (unified detection limit: 0.1 ppb for water and 0.0092 ppm for bottom sediments).

4) From the above survey results, although pyridine was detected in water and bottom sediments, the detected frequency was low. But since it was detected in multiple media, it is desirable to conduct environmental surveys at a certain interval in future.

○ Survey results of pyridine

		(sample)	(area)	detection range	detection limit
water	FY1980	22%(2/9)	33%(1/3)	0.3 to 0.4 ppb	0.1 to 0.2 ppb
	FY1991	17%(6/36)	17%(2/12)	0.13 to 0.2 ppb	0.1 ppb
	FY1998	18%(6/33)	18%(2/11)	0.29 to 0.41 ppb	0.1 ppb
bottom sediments	FY1980	67%(6/9)	67%(2/3)	0.006 to 0.031ppm	0.002 to 0.01 ppm
	FY1991	46%(18/39)	46%(6/13)	0.0068 to 0.1 ppm	0.005 ppm
	FY1998	18%(6/33)	18%(2/11)	0.013 to 0.019 ppm	0.0092 ppm
fishes	FY1984	49%(19/39)	54%(7/13)	0.0045 to 0.075 ppm	0.003 ppm

○ Results of acute toxicity tests etc. for pyridine

・ rat	LD50 (oral)	891 mg/kg
・ mouse	LD50 (oral)	1,500 mg/kg
・ rat	LC50 (inhalation)	28,500 mg/m3×1hr

・Instillation of 2 mg of this substance to an eye of rabbit shows strong irritancy and application of 500 mg of the substance to skin shows weak irritancy.

・ In an animal experiment, acute toxicity is mainly anesthetic influence and irritating influence to mucous membrane and skin.

・Teratogenicity: Positive in teratogenicity in an experiment using eggs of hens. Positive in an experiment using embryos of horned frogs and 96hr ED50 is 1,200 mg/l.

・ Tumorigenicity: No tumorinogenicity was observed at a repeated subcutaneous administration. But a preliminary report of a 2 years test on rats and mice where the substance is added to drinking water states that a clear evidence showing carcinogenicity was found for male and female mice and some evidence for male rats and an equivocal evidence for female rats.

・ Mutagenicity: Negative in an Ames test, a chromosomal abberation test using Chinese hamster culture cells and a syster chromatid exchange test.

・ Case histories: Symptoms in central nervous system and gastro-intestinal are reported. Main symptoms are headache, dizziness, anxiety, insomnia, nausea and vomitting.

In case of a man exposed at 125 ppm concentration for 4 hours a day and for 1 to 2 weeks, transient symptom in central nervous system was observed but no damages in liver and kidney.

○ Results of ecological effect tests for pyridine

・ Oryzias latipes	24hr LC50	400 mg/l
・ fathead minnow	48hr LC50	115 mg/l

⑰ N,N-Dimethylformamide

1) N,N-Dimethylformamide is used for manmade leathers or urethanic synthetic leathers, Spandex fibers, solvents for analytical chemistry and for syntheses of pharmaceuticals, agricultural chemicals and dyestuffs intermediates, solvents for various polymers, gas absorbants and solvents for coloring materials. The production volume in 1997 was 36,000 tons (estimated).

2) In the results of the fiscal year 1978 General Environmental Survey, N,N-dimethylformamide was not detected in water and bottom sediments (detection limit: 10 to 50 ppb for water and 0.1 to 0.3 ppm for bottom sediments) . And in FY1991, it was detected from 7 out of 16 areas (18 out of 48 samples) in water and from 3 out of 16 areas (9 out of 48 samples) in bottom sediments (unified detection limit: 0.1 ppb for water and 0.013 ppm for bottom sediments).

3) In the results of this survey, N,N-dimethylformamide was detected from 2 out of 12 areas (5 out of 36 samples) in water and from 4 out of 12 areas (10 out of 36 samples) in bottom sediments. The detection range was 0.08 to 0.11 ppb for water and 0.0033 to 0.03 ppm for bottom sediments (unified detection limit: 0.07 ppb for water and 0.003 ppm for bottom sediments).

4) From the above survey results, although N,N-dimethyformamide was detected in both water and bottoms sediments, the detected concentration levels are decreasing in comparison with the results of FY1991 survey. But since the production volume is large and it was detected in multiple media, it is desirable to conduct environmental surveys at a certain interval in view of the tendencies of production and usage.

○ Survey results of N,N-dimethylformamid

		(sample)	(area)	detection range	detection limit
water	FY1978	0%(0/24)	0%(0/8)	not detected	10 to 50 ppb
	FY1991	38%(18/48)	44%(7/16)	0.1 to 6.6 ppb	0.1 ppb

	FY1998	14%(5/36)	17%(2/12)	0.08 to 0.11 ppb	0.07 ppb
bottom sediments	FY1978	0%(0/24)	0%(0/8)	not detected	0.1 to 0.3 ppm
	FY1991	19%(9/48)	19%(3/16)	0.03 to 0.11 ppm	0.013 ppm
	FY1998	28%(10/36)	33%(4/12)	0.0033 to 0.03 ppm	0.003 ppm

○ Results of acute toxicity tests etc. for N,N-dimethylformamid

・ rat	LD50 (oral)	2,800 mg/kg
・ mouse	LD50 (oral)	3,700 mg/kg
・ rat	LC50 (inhalation)	5,000 ppm×6hr
・mouse	LC50 (inhalation)	9,400 mg/m3×2hr

・In experiments where mice, rats, guinea pigs, rabbits, dogs were exposed at 23 ppm×5.5hr and 426 ppm×0.5hr in total 6 hr a day for 58 times, increase of weight of liver and liver function disturbance were observed and histologically changes were observed in liver, pancreas, kidney adrenal gland and thymus.

・Teratogenicity: Minimal toxic level at oral administration is reported to be 182 mg/kg for mouse and 166 mg/kg for rat. For inhalation test of rabbit it is reported to be 150 mg.

In an experiment of oral administration to rats on the 6th through 20th day of pregnancy, suppression of weight increase and lowering of feed intake of mother animals were observed at the doses of 100 mg/kg or higher, and lowering of weight of fetuses was observed at the doses of 100 mg/kg or higher, and delay in ossification of parietal bones and sterna was caused in fetuses at 200 and 300 mg/kg doses. Accordingly, NOAEL was judged to be 50 mg/kg for both mother animals and fetuses.

・ Mutagenicity: Negative in an Ames test (TA1535, TA1538, TA98, TA100). Negative in a syster chromatid exchange test. Negative in unscheduled DNA synthesis test using rat liver cells.

・ Case histories: Concerning chronic poisoning in workplace, workers who have been exposed with dimethylformamid at the concentration of not higher than 10 ppm, mostly not higher than 20 ppm, rarely 30 ppm in the production field of polyacryolnitril fibers from acrylonitril have subjective symptoms of stomachache, headache, anorexia, nausea etc. and there was a case of changes in electrocardiogram although the change was within the normal range. No disturbance in function of liver was not observed.

○ Results of ecological effect tests for N,N-dimethylformamid

・ Oncorhynchus mykiss	96hr LC50	1,020 mg/l
・ Daphnia magna	48hr LC50	13 mg/l

⑱ N-tert-butyl-2-benzothiazolesulfenamide

1) N-tert-butyl-2-benzothiazolesulfenamide is used as a vulcanization accelerator for

organic rubbers.

2) In the results of this survey, N-tert-butyl-2-benzothiazolesulfenamide was not detected in water and bottom sediments (unified detection limit:0.1 ppb for water and 0.0047 ppm for bottom sediments).

3) From the above survey results, it does not seem to pose any problems at present.

○ Survey results of N-tert-butyl-2-benzothiazolesulfenamide

		(sample)	(area)	detection range	detection limit
water	FY1998	0%(0/39)	0%(0/13)	not detected	0.1 ppb
bottom sediments	FY1998	0%(0/36)	0%(0/12)	not detected	0.0047 ppm

○Results of acute toxicity tests etc. for N-tert-butyl-2-benzothiazolesulfenamide

・ rat	LD50 (oral)	7,940 mg/kg
・ mouse	LD50 (oral)	5,000 mg/kg
	LD50 (subcutaneous)	180 mg/kg

⑲ N-Cyclohexyl-2-benzothiazolesulfenamide

1) N-Cyclohexyl-2-benzothiazolesulfenamide is used as a vulcanization accelerator for rubbers.

2) In the results of the fiscal year 1977 General Environmental Survey, N-cyclohexyl-2-benzothiazolesulfenamide was not detected in water and bottom sediments (detection limit: 0.02 to 0.08 ppb for water and 0.0023 to 0.02 ppm for bottom sediments).

3) In the results of this survey, N-cyclohexyl-2-benzothiazolesulfenamide was not detected in water and bottom sediments (unified detection limit:0.21 ppb for water and 0.01 ppm for bottom sediments).

4) From the above survey results, it does not seem to pose any problems at present.

○ Survey results of N-cyclohexyl-2-benzothiazolesulfenamide

		(sample)	(area)	detection range	detection limit
water	FY1977	0%(0/12)	0%(0/6)	not detected	0.02 to 0.08 ppb
	FY1998	0%(0/36)	0%(0/12)	not detected	0.21 ppb
bottom sediments	FY1977	0%(0/12)	0%(0/6)	not detected	0.0023 to 0.02ppm
	FY1998	0%(0/39)	0%(0/13)	not detected	0.01 ppm

○Results of acute toxicity tests etc. for N-cyclohexyl-2-benzothiazolesulfenamide

・ rat	LD50 (oral)	5,300 mg/kg
・ mouse	LD50 (oral)	>8,000 mg/kg
・ mouse	LD50 (subcutaneous)	32 mg/kg

⑳ N,N-Dicyclohexyl-2-benzothiazolesulfenamide

1) N,N-Dicyclohexyl-2-benzothiazolesulfenamide is used as a vulcanization accelerator for rubbers (estimated).

2) In the results of this survey, N,N-dicyclohexyl-2-benzothiazolesulfenamide was not detected in water and bottom sediments (unified detection limit:0.3 ppb for water and 0.01 ppm for bottom sediments).

3) From the above survey results, it does not seem to pose any problems at present.

○ Survey results of N,N-dicyclohexyl-2-benzothiazolesulfenamide

		(sample)	(area)	detection range	detection limit
water	FY1998	0%(0/39)	0%(0/13)	not detected	0.3 ppb
bottom sediments	FY1998	0%(0/39)	0%(0/13)	not detected	0.01 ppm

○Results of acute toxicity tests etc. for N,N-dicyclohexyl-2-benzothiazolesulfenamide

・ rat	LD50 (oral)	6,420 mg/kg

(21) Benzothiophene

1) Benzothiophene is used as a raw material for pharmaceuticals production and intermediates for thioindigo dyes.

2) In the results of this survey, benzothiophene was detected from 4 out of 12 areas (11 out of 36 samples) in bottom sediments and not detected in water and fishes. The detection range was 0.0023 to 0.023 ppm for bottom sediments(unified detection limit:0.05 ppb for water, 0.002 ppm for bottom sediments and 0.001 ppm for fishes).

3) From the above survey results, since the detection frequency of benzothiophene in bottom sediments is rather high, it is required to conduct environmental surveys at a certain interval and to endeavor to collect more detailed information.

○ Survey results of benzothiophene

		(sample)	(area)	detection range	detection limit
water	FY1998	0%(0/42)	0%(0/14)	not detected	0.05 ppb
bottom sediments	FY1998	31%(11/36)	33%(4/12)	0.0023 to 0.23 ppm	0.002 ppm
fishes	FY1998	0%(0/42)	0%(0/14)	not detected	0.001 ppm

○ Results of ecological effect tests for benzothiophene

・ Selenastrum capricornutum	10days EC50 (growth)	10,000 mg/l
・ Daphnia magna	48hr LC50	2.90 mg/l
	48hr LC50	59.0 mg/l
・ Artemia salina	48hr HAT(hatch inhibition)	10 mg/l
・ Poecilia reticurata	96hr LC50	13.6 mg/l

(22) Dibenzothiophene

1) Dibenzothiophene is used for intermediates of cosmetics and pharmaceuticals.

2) In the results of the fiscal year 1983 General Environmental Survey, dibenzothiophene was not detected in water and was detected from 2 out of 15 areas (6 out of 45 samples) in bottom sediments (detection limit: 0.05 to 0.1 ppb for water and 0.001 to 0.007 ppm for bottom sediments).

3) In the results of this survey, dibenzothiophene was detected from 10 out of 13 areas (28 out of 39 samples) in bottom sediments and from 5 out of 13 areas (15 out of 39 samples) in fishes and not detected in water. The detection range was 0.0022 to 0.14 ppm for bottom sediments and 0.00071 to 0.013 ppm for fishes (unified detection limit: 0.02 ppb for water, 0.0021 ppm for bottom sediments and 0.00034 ppm for fishes).

4) From the above survey results, dibenzothiophene was detected in bottom sediments and fishes and since the detection frequency is high for bottom sediments and rather high for fishes, it is required to conduct more detailed environmental surveys and to endeavor to collect information.

○ Survey results of dibenzothiophene

		(sample)	(area)	detection range	detection limit
water	FY1983	0%(0/45)	0%(0/15)	not detected	0.05 to 0.1 ppb
	FY1998	0%(0/42)	0%(0/14)	not detected	0.02 ppb
bottom sediments	FY1983	13%(6/45)	13%(2/15)	0.001 to 0.005 ppm	0.001 to 0.007ppm
	FY1998	72%(28/39)	77%(10/13)	0.0022 to 0.14ppm	0.0021 ppm

fishes	FY1998	38%(15/39)	38%(5/13)	0.00071 to 0.013ppm	0.00034 ppm

○Results of acute toxicity tests etc. for dibenzothiophene

・ mouse	LD50 (oral)	470 mg/kg
	LD50 (intraperitoneal)	>500 mg/kg

○ Results of ecological effect tests for dibenzothiophene

・ Selenastrum capricornutum	10days EC50 (growth)	8,000 mg/l
・ Daphnia magna	48hr LC50	0.466 mg/l
・ Artemia salina	48hr HAT(hatch inhibition)	10 mg/l
・ Poecilia reticurata	96hr LC50	0.70 mg/l

(23) nonionic surfactants

1) In the results of the fiscal year 1982 General Environmental Survey, nonionic surfactants were detected from 8 out of 24 areas (17 out of 72 samples) in water and was from 22 out of 24 areas (54 out of 72 samples) in bottom sediments (detection limit: 3 to 10 ppb for water and 0.1 to 0.2 ppm for bottom sediments).

2) In the results of this survey, nonionic surfactants were detected from 3 out of 15 areas (7 out of 45 samples) in water and from 10 out of 14 areas (29 out of 42 samples) in bottom sediments. The detection range was 3.5 to 22 ppb for water and 0.0086 to 12 ppm for bottom sediments (unified detection limit: 3 ppb for water and 0.082 ppm for bottom sediments).

3) From the above survey results, nonionic surfactants were detected in water and bottom sediments and since the detection frequency is high for bottom sediments, it is required to investigate to develop analytical methods for individual components and to conduct more detailed environmental surveys.

○ Survey results of nonionic surfactants

		(sample)	(area)	detection range	detection limit
water	FY1982	24%(17/72)	33%(8/24)	5 to 50 ppb	3 to 10 ppb
	FY1998	16%(7/45)	20%(3/15)	3.5 to 22 ppb	3 ppb
bottom sediments	FY1982	75%(54/72)	92%(22/24)	0.16 to 12.4 ppm	0.1 to 0.2ppm
	FY1998	69%(29/42)	71%(10/14)	0.0086 to 12ppm	0.082 ppm

【 major nonionic surfactants 】

＜ polyoxyethylene sorbitan aliphatic acid esters ＞

○Results of acute toxicity tests etc. for polyoxyethylene sorbitan aliphatic acid esters

・ rat	LD50 (oral)	>60 ml/kg
・ rat	LD50 (intraperitoneal)	7.5 ml/kg
・ mouse	LD50 (intraperitoneal)	6.3 ml/kg

・ In an experiment of 2 years oral administration to rats, increase in the weight of digestive tract and liver was observed. In a case of 95 weeks oral administration to mice, effects on blood system were observed. In experiments on carcinogenesis by skin application to rats (7 weeks) and mice (35weeks), tumorigenesis was observed at the place of application in both cases. In reproductive toxicity tests using rats and mice, effects on growth of newborns were observed.

＜ polyoxyethylene alkyl ethers ＞

○Results of acute toxicity tests etc. for polyoxyethylene alkyl ethers

・ Acute toxicity on mammalian is dependent on length of alkyl group and number of added oxyethylene molecules. LD50 (oral) for rat and mouse is not less than 1,000 mg /kg and LD50 (intraperitoneal) for rat is 125 to 250 mg/kg and LD50 (dermal) for rabbit is not less than 1,000mg/kg and LC50 (inhalation, 4hr) for rat is not less than 1,500 mg/m3. LC50 (96hr) for fishes depends on structure and sort of fishes but approximately in the range of 0.7 to 3 mg/l.

・ In a 91 days experiment where rats were fed by foods to which $C_{13}AE_6$ (This means that the number of carbon atoms in the alkyl group is 13 and the number of added mols of oxyethylene is 6., the same hereinafter) is added at the concentration of 0, 5, 50, 500 ppm, no appreciable changes were observed except slight change in seminiferous tubuli at 500 ppm dose administration(The reporter judges this independent of the exposure.) and for the cases of $C_{13}AE_6$ and $C_{14}AE_7$ at the concentration of 0, 0.1, 0.5 and 1.0% of foods, suppression of body weight increase and increase in relative weight of liver, etc. were observed for 0.5% dose group and 1.0% dose group. On the other hand no appreciable changes were observed in the case where rats were bred with foods containing max. ca. 2% of $C_{12}AE_7$. In a case of dermal application of $C_{13}AE_6$ for 4 to 13 weeks at 20 to 50 mg /kg/day rate, irritation to skin and death of sepsis due to infection were observed for rabbits. No carcinogenesis was observed in the following experiments: repeated dermal application of 50% aqueous solution of the substance to mice 2 times a week for 1 year; dermal application of 5 and 20% solution of the substance to rats 2 times a week for 18 months; ingestion of $C_{14\text{-}15}AE_7$ at the concentration of 0, 0.1, 0.5, 1.0% in foods to rats for 2 years.

・ It is negative in Ames test and no teratogenicity was observed in an experiment of dermal application of 4% solution at the rate of 0.05 ml/10 g mouse once a day on the 7th through 12th days of pregnancy.

○ Results of ecological effect tests for polyoxyethylene alkyl ethers

・ 24hr LC50 for fishes are approximately in the range of 1 to 6 ppm. (There are exceptions, e.g. for Poecilia reticurata 0.7 ppm and cod >0.5 ppm.)

・ On 50% inhibition concentration for growth of algae there are reports of 38, 52 and 56 ppm and on lethal concentration of algae there is a report of 100 ppm.

＜ polyoxyethylene alkylamids ＞

＜ polyoxyethylene alkylamines ＞

＜ polyoxyethylene alkylphenylethers＞

○Results of acute toxicity tests etc. for polyoxyethylene alkylphenylethers

・ LD50(oral) for rat is minimum (LD50 = 1 to 3 g/kg) at the number of oxyethylene of approximately 10 and increases some 10 times at about 40 of the number of oxyethylene. Toxicity (dermal) on rabbit is 1 to 10 g/kg in a case where number of oxyethylene lies in 5 to 12. Irritancy to rabbit skin is moderate to medium. A threshold concentration of a substance having 1 to 13 number of oxyethylene on irritancy to rats eye mucous membrane was 15%.

・In a 2 years experiment of rats fed by foods containing 1.4% of polyoxyethylene(40) octylphenylether, no toxicity and carcinogenicity were observed. It is reported that in 2 years experiments of rats and dogs fed by foods containing 0.27% of polyoxyethylene(4) nonylphenylether, no toxicity and carcinogenicity were observed.

○ Results of ecological effect tests for polyoxyethylene alkylphenyl ethers

・ LC50 for fishes are largely in the range of 4 to 12 ppm. Brown trout is the most sensitive and 96hr LC50 is 1 ppm and the least sensitive was himehaya at 65 ppm. Planktons in sea was inhibited at 10 to 1000 ppm.

(24) Phenol

1) Phenol is used as a raw material for bisphenol A, aniline, 2,6- xylenol, phenolic resins (phenol formaldehyde resin), disinfectants, dental local anesthetics, picric acid, salicylic acid, phenacetin, dyestuff intermediates, 2,4-dichloro-phenoxyacetic acid(2,4-DA) , synthetic fragrances, agricultural chemicals, stabilizers, plasticizers and surfactants. The production volume in 1997 was 832,731 tons.

2) In the fiscal year 1977 General Environmental Survey, phenol was not detected in water and was detected from 1 out of 3 areas (3 out of 9 samples) in bottom sediments (detection limit: 0.2 to 10 ppb for water and 0.01 to 0.1 ppm for bottom sediments). And in FY 1996, it was detected from 34 out of 46 areas (76 out of 136 samples) in water and from 45 out of 49

areas (110 out of 129 samples) in bottom sediments and from 27 out of 45 areas (63 out of 133 samples) in fishes (unified detection limit: 0.03 ppb for water, 0.0054 ppm for bottom sediments and 0.02 ppm for fishes).

3) In the results of this survey, phenol was detected from 5 out of 10 areas (15 out of 30 samples) in water, from 8 out of 10 areas (23 out of 29 samples) in bottom sediments and from 8 out of 11 areas (16 out of 30 samples) in fishes. The detection range was 0.066 to 0.70 ppb for water, 0.012 to 0.50ppm for bottom sediments and 0.024 to 0.062 ppm for fishes (unified detection limit: 0.03 ppb for water, 0.0054 ppm for bottom sediments and 0.02 ppm for fishes).

4) From the above survey results, phenol was detected in all media of water, bottom sediments and fishes, and detection frequency is high and since the tendency is similar to the previous FY1996 survey, it is required to conduct detailed environmental surveys in future and at the same time risk assessment.

○ Survey results of phenol

		(sample)	(area)	detection range	detection limit
water	FY1977	0%(0/9)	0%(0/3)	not detected	0.2 to 10 ppb
	FY1996	56%(76/136)	74%(34/46)	0.030 to 1.47ppb	0.03 ppb
	FY1998	50%(15/30)	50%(5/10)	0.066 to 0.70 ppb	0.03 ppb
bottom sediments	FY1977	33%(3/9)	33%(1/3)	0.03 to 0.04ppm	0.01 to 0.01ppm
	FY1996	85%(110/129)	92%(45/49)	0.0055 to 0.94ppm	0.0054 ppm
	FY1998	79%(23/29)	80%(8/10)	0.012 to 0.50ppm	0.0054 ppm
fishes	FY1996	47%(63/133)	60%(27/45)	0.020 to 0.586ppm	0.02 ppm
	FY1998	53%(16/30)	73%(8/11)	0.024 to 0.062 ppm	0.02 ppm

○Results of acute toxicity tests etc. for phenol

・ rat	LD50 (oral)	317 mg/kg
	LD50 (dermal)	669 mg/kg
	LC50 (inhalation)	316 mg/m3×time not known
・ mouse	LD50 (oral)	270 mg/kg
	LC50 (inhalation)	177 mg/m3×time not known

・ Irritancy on rabbit skin is strong.

・ There is a report that states minimum oral lethal level for human (infant) is 10 mg/kg and that for human adult is 140 mg/kg. If contacted with skin, local damage is strong and various phases ranging from inflammation to necrosis is observed.

According to an experience with human, no irritancy and other unpleasant sensation were observed for volunteers and workers at 5.2 ppm level.

・ Tumorigenicity: In an experiment where $B6C3F_1$ mice and Fischer344 rats are bred for 104 to 105 weeks, with drinking water to which phenol is added at 0, 2,500, 5,000 mg/l concentration, tumorigenicity was not observed for mice. But for the rats and only at 2,500mg/l dose, tendency of rise in pheocromocytoma on adrenal cortex, leukemia and C-cell cancer on thyloid.

・ Mutagenicity: Negative in Ames test. Negative in micronucleus test using CHO cells.

○ Results of ecological effect tests for phenol

・ fresh water fish	96hr LC50 (min. value)	1.6 ppm
・ marine fish	96hr LC50	10 ppm
・ fresh water crustacea	96hr LC50	4.0 to 230 ppm
・ fresh water shellfish	96hr LC50	69 to 129 ppm
・ Oryzias latipes (fresh water)	96hr LC50	38.8 ppm

(2) Air

The summary of each detected substance in air is as follows.

① Methyl bromide

1) Methyl bromide is used as a fumigant for foods and soil and a feedstock in organic syntheses.

2) In the results of the fiscal year 1980 General Environmental Survey, Methyl bromide was detected at 3 out of 6 areas and in 5 out of 27 samples(detection limit: 0.015 to 0.1 ppb).

3) In the results of this survey, methyl bromide was detected at 13 out of 14 areas and in 36 out of 39 samples, and the detection range was 49 to 340 ng/m3 (unified detection limit: 41 ng/m3).

4) From the above survey results, detection frequency of methyl bromide is high and since there is a tendency of increase in comparison with the previous survey of 1980, it is required to conduct more detailed environmental survey in future and to observe the change and at the same time to make risk assessment.

○ Survey results of methyl bromide

	(samples)	(areas)	detection range	detection limit
FY1980	19%(5/27)	50%(3/6)	0.015 to 0.031 ppb (59 to 122 ng/m3)	0.015 to 0.1 ppb (59 to 395 ng/m3)
FY1998	92%(36/39)	93%(13/14)	49 to 340 ng/m3	41 ng/m3

○Results of acute toxicity tests etc. for methyl bromide

・ human	TDLo (inhalation)	35 ppm
	TDLo (dermal)	35 g/m3/40months
・ rat	LD50 (oral)	214 mg/kg
	LC50 (inhalation)	302 ppm/8hr
・ rabbit	LC50 (inhalation)	2,000 mg/m3/11hr
・ mouse	LC50 (inhalation)	1,540 mg/m3/2hr

・ Target of toxicity is summarized in irritancy to skin and respiratory organs, and effect on central nervous system, and renal damage.

・ Case history: In a case of a worker exposed during ventilation work after housing fumigation, vomiting and feeling of asphyxia was observed during the work. During medical attendance in hospital, epilepsy like spasm was observed. For several of colleagues of him, ataxia or convulsion in four limbs or whole body were observed on the day of exposure or the following day.

② Ethyl bromide

1) Ethyl bromide is used as a raw material for pharmaceuticals, stabilizers of polyvinyl chloride, agricultural chemicals, refrigerant. The production volume in 1997 was 100 tons (estimated).

2) In the results of the fiscal year 1983 General Environmental Survey, Ethyl bromide was detected at 5 out of 34 areas and in 15 out of 101 samples (detection limit: 0.001 to 0.017 ppb) and in FY1997 at 3 out of 10 areas and in 5 out of 30 samples. The detection range was 5.9 to 53 ng/m3 (unified detection limit: 5.4 ng/m3).

3) In the results of this survey, ethyl bromide was not detected (unified detection limit: 40 ng/m3).

4) From the above survey results, it does not seem to pose any problems at present.

○ Survey results of ethyl bromide

	(samples)	(areas)	detection range	detection limit
FY1983	15%(15/101)	15%(5/34)	0.002 to 0.059 ppb	0.001 to 0.017 ppb
			(9.1 to 268 ng/m3)	(4.5 to 77 ng/m3)
FY1997	17%(5/30)	30%(3/10)	5.9 to 53 ng/m3	5.4 ng/m3
FY1998	0%(0/36)	0%(0/12)	not detected	40 ng/m3

○ Results of acute toxicity tests etc. for ethyl bromide

- rat LC50 (inhalation) 26,980 ppm × 1hr
- mouse LC50 (inhalation) 16,230 ppm × 2hr
- At higher concentration there is an influence of suppression in central nervous system and exposure of guinea pigs at 6,500 ppm for 270 min. produced death and exposure at 24,000 ppm for 30 min. brought death and pathophysiological changes in lung and spleen.

Exposure at 50,000 ppm for 100 min. brought loss of consciousness.

- Reproductive toxicity: In an 14 weeks repeated dose experiment on rats and mice at 100 to 1,600 ppm and 6 hours a day and 5 days a week, there were observations of strong testicular atrophy in the 1,600 ppm dose group of rats and lowering of size and number of corpus luteum in the 800 ppm and 1,600 ppm dose groups of mice.
- Tumorigenicity: In an 104 weeks repeated dose experiment on $B6C3F_1$ mice and Fischer 344 rats at 0, 100, 200, 400 ppm and 6 hours a day and 5 days for 104 weeks, tumorigeneses at endometrium rose depending on the concentration in mice. Although tumorigeneses at

liver were observed in males, its statistical significance was marginal. Although a rise in geneses of pheochromocytoma was observed in male rats, there was no dose dependence.

・ Mutagenicity: Positive in Ames test. Positive in sister chromatid exchange test using Chinese hamster CHO cells. But negative in chromosomal abberation test.

・ Case history: When exposed at 6,500 ppm for 5 min., dizziness, slight headache and slight irritancy at eyes were observed. At 200 ppm concentration, ether-like odor was sensed.

③ vinyl chloride

1) Vinyl chloride is used for manufacturing of polyvinyl chloride resin, vinyl chloride copolymers (with ethylene, vinylidene chloride, vinyl propionate, etc.) and latices (ordinally paints, ship bottom paints, paper glazing agents, adhesives, moisture proof cellophane etc.). The production / importation volume in 1997 was 3,124,222 tons.

2) In the results of the fiscal year 1979 General Environmental Survey, vinyl chloride was detected in 3 out of 17 areas and 7 out of 45 samples (detection limit: 0.002 to 2 ppb), and in FY 1980 it was detected in 3 out of 22 areas and 10 out of 117 samples (detection limit: 0.02 to 2 ppb), and in FY 1997 it was detected in 15 out of 18 areas and 40 out of 53 samples (unified detection limit: 15ng/m3).

3) In the results of this survey, vinyl chloride was detected in 12 out of 13 areas and 31 out of 36 samples, and the detection range was 16 to 1,300 ng/m3 (unified detection limit: 14 ng/m3).

4) From the above survey results, the detection frequency was high for vinyl chloride, and since the level of detected concentration remains at the same level as in the previous surveys,
it is required to conduct detailed surveys including the surroundings of discharge sources and to observe its change and to make risk assessment at the same time.

○ Survey results of vinyl chloride

	(samples)	(areas)	detection range	detection limit
FY1979	16%(7/45)	19%(3/17)	0.022 to 4.0 ppb (57 to 10,400 ng/m3)	0.002 to 2 ppb (5.2 to 5,200 ng/m3)
FY1980	16%(10/117)	9%(3/22)	0.02 to 1.35 ppb (52 to 3,510 ng/m3)	0.02 to 2 ppb (52 to 5,200 ng/m3)
FY1997	75%(40/53)	83%(15/18)	18 to 2,000 ng/m3	15 ng/m3
FY1998	86%(31/36)	92%(12/13)	16 to 1,300 ng/m3	14 ng/m3

○ Results of acute toxicity tests etc. for vinyl chloride

・ rat LD50 (inhalation) 18,000 mg/kg

・ Reproductive toxicity: It is suggested that mortality rate of fetuses rises, when its fathers are exposed with vinyl chloride at workplaces. However, this is not yet conclusive in teratogenicity experiments using animals.

・ Tumorigenicity: All positive in animal experiments using rats, mice and hamsters. Reported sorts of tumors are hepatocellular carcinoma, Zymbal gland carcinoma and neuroblastoma etc., other than hemangioma of liver.

・ Case history: It is internationally known that workplace exposure to vinyl chloride develops hemangioma, tipically for workers cleaning polymerization vessels, and the cases were reported from Japan, too. The latent period in average is estimated to be 18 years.

④ 1,2-Dibromoethane

1) In the results of the fiscal year 1983 General Environmental Survey, 1,2-dibromoethane was detected in 10 out of 12 areas and 71 out of 108 samples (detection limit: 0.0003 to 0.001 ppb), and in FY 1997 it was not detected (unified detection limit: 90 ng/m3).

2) In the results of this survey, 1,2-dibromoethane was not detected (unified detection limit: 71 ng/m3).

3) From the above survey results, 1,2-dibromoethane does not seem to pose any problems at present.

○ Survey results of 1,2-dibromoethane

	(samples)	(areas)	detection range	detection limit
FY1983	66%(71/108)	83%(10/12)	0.001 to 0.067 ppb	0.0003 to 0.001 ppb
			(7.8 to 524 ng/m3)	(2.3 to 7.8 ng/m3)
FY1997	0%(0/57)	0%(0/19)	not detected	90 ng/m3
FY1998	0%(0/39)	0%(0/13)	not detected	71 ng/m3

○ Results of acute toxicity tests etc. for 1,2-dibromoethane

・ rat LD50 (oral) 108 mg/kg

LC50 (inhalation) 4,300 mg/m3×30min

・ In repeated vapor exposure experiments using animals, there were cases observed where exposure to rats, Guinea pigs, rabbits and monkeys at 50 to 100 ppm for several days caused fatty degeneration of liver and renal damage leading to death. Nontoxic concentration was 25 ppm (max.200 days repeated dose test) for Guinea pigs, rabbits and monkeys.

・ Tumorigenicity: In experiments of exposure to male and female rats at about 40 mg/kg/day for 110 weeks and to male and female mice at 62 mg/kg/day and 107 mg/kg/day for 78 to 90 weeks, rise in incidence of squamous cell carcinoma at proventriculus for all groups and of lung cancer additionally for mice. And thus carcinogenicity was confirmed.

・ Reproductive toxicity: Administration of 4 mg/kg/day repeated administration to oxen developed disturbance in sperm formation. In an experiment of subcutaneous administration to male rabbits at 0, 15, 30 and 45 mg/kg/day for 5 days, ejaculation volume decreased depending on doses and for the 45 mg/kg dose lowering of sperm movement was confirmed. But there were no changes in capability to impregnate and in development of fetuses.

・ Mutagenicity: Positive in Ames test.

⑤ 2-Bromopropaane

1) 2-Bromopropane is used for intermediates of pharmaceuticals, agricultural chemicals, photosensitive agents and for various organic syntheses and for solvents. The production volume in 1997 was 100 tons (estimated).

2) In the results of the fiscal year 1997 General Environmental Survey, 2-bromopropane was not detected (unified detection limit: 200 ng/m3).

3) In the results of this survey, 2-bromopropane was not detected (unified detection limit:170 ng/m3).

4) From the above survey results, 2-bromopropane does not seem to pose any problems at present.

○ Survey results of 2-bromopropane

	(samples)	(areas)	detection range	detection limit
FY1997	0%(0/57)	0%(0/19)	not detected	200 ng/m3
FY1998	0%(0/39)	0%(0/13)	not detected	170 ng/m3

○ Results of acute toxicity tests etc. for 2-bromopropane

・ mouse LC50 (inhalation) 31,171 ppm×4 hr

・ Reproductive toxicity: In a repeated dose experiment on male rats at 300, 1,000 and 3,000 ppm and 8hr/day and 7 days a week for 9 weeks (max. up to 11 weeks for 3,000 ppm group), inhibition of sperm formation and lowering of hemopoietic function at bone marrow were observed. In another repeated dose experiment on female rats at 100, 300 and 1,000 ppm and 8 hr/day and 7 days a week for 9 weeks, disturbance in sexual cycle (prolonged anestrus etc.) developed and at ovary, increase in follicular atresia and decrease in number of corpus luteums were observed.

・ Mutagenicity: Positive independent of addition of S9-mix for the strains of TA100 and TA1535. Negative in chromosomal abberation test and micronucleus test.

・ Case history: It is reported that in Summer of 1995 there was a high incidence of irregularity of menstruation in female workers who had started cleaning work of parts using the substance in February 1994. The total number of workers (age of 19 to 49) were 25 women and 8 men and through subjective symptoms and clinical investigations ovary disfunction was observed for 17 women and oligozoospermia for 6 men, among the workers. In view of this, Japanese Ministry of Labor requested end of 1995 the manufacturers of 2-bromopropane and other related industries to take necessary measures for prevention of the health impairment.

⑥ 1-Chlorobutane

1) 1-Chlorobutane is used for organometallic compounds intermediates,manufacturing of pharmaceuticals, alkyl amines, surfactants, alkyl sodium sulfonates, stabilizers for polyvinyl chloride resin, butyl mercaptan, vermicides.

2) In the results of the fiscal year 1997 General Environmental Survey, 1-chlorobutane was detected in 1 out of 19 areas and 2 out of 57 samples (unified detection limit: 200 ng/m3).

3) In the results of this survey, 1-chlorobutane was detected in 9 out of 13 areas and 19 out of 37 samples, and the detection range was 38 to 1,400 ng/m3 (unified detection limit: 37 ng/m3).

4) From the above survey results, the level of detection concentration of 1-chlorobutane is not the one which poses problems but since its detection frequency is high, it is required to conduct environmental surveys at a certain interval in future.

○ Survey results of 1-chlorobutane

	(samples)	(areas)	detection range	detection limit
FY1997	4%(2/57)	5%(1/19)	21 to 290 ng/m3	200 ng/m3
FY1998	51%(19/37)	69%(9/13)	38 to 1,400 ng/m3	37 ng/m3

○ Results of acute toxicity tests etc. for 2-bromopropane

・ rat	LD50 (oral)	2,670 mg/kg

・ Instillation of 500 mg to an eye of rabbits shows slight irritancy. And irritancy when 500 mg are applied to skin of rabbits is slight.

⑦ 3,4-Dichloro-1-butane

1) In the results of the fiscal year 1997 General Environmental Survey, 3,4-dichloro-1-butane was not detected (unified detection limit: 60 ng/m3).

2) In the results of this survey, 3,4-dichloro-1-butane was detected in 1 out of 12 areas and 1 out of 36 samples, and the value detected was 80 ng/m3 (unified detection limit: 60 ng/m3).

3) From the above survey results, detection frequency for 3,4-dichloro-1-butane is low and at present it does not seem to pose any problems.

○ Survey results of 3,4-dichloro-1-butane

	(samples)	(areas)	detection range	detection limit
FY1997	0%(0/57)	0%(0/19)	not detected	60 ng/m3
FY1998	3%(1/36)	8%(1/12)	80 ng/m3	60 ng/m3

○ Results of acute toxicity tests etc. for 3,4-dichloro-1-butane

・ rat LC50 (inhalation) 2,100 ppm×4hr

⑧ Toluene

1) Toluene is used for dyestuffs, fragrances, powders (TNT), organic pigments, cresols, sweeteners, bleaching agents, TDI (raw material of polyurethenes), raw material of terephtharic acid, raw material of benzene and xylenes (disproportionation method), paints, solvents for inks. The production volume for 1997 was 1,418,694 tons (derived from petroleum).

2) In the results of this survey, toluene was detected in 14 out of 14 areas and 42 out of 42 samples, and the detection range was 1,100 to 85,000 ng/m3 (unified detection limit: 80 ng/m3).

3) From the above survey results, since the detection frequency of toluene is high and the level of detection concentration is relatively high, it is required to conduct environmental surveys in future and to observe the change and to make risk assessment at the same time.

○ Survey results of toluene

	(samples)	(areas)	detection range	detection limit
FY1998	100%(42/42)	100%(14/14)	1,100 to 85,000 ng/m3	80 ng/m3

○ Results of acute toxicity tests etc. for toluene

・ human	LDLo (oral)	25 mg/kg
	LDLo (inhalation)	100 ppm
・ rat	LD50 (oral)	636 mg/kg
	LDLo (inhalation)	49 g/m3/4hr
・ mouse	LC50 (inhalation)	400 ppm

・ Toluene influences on central nervous system and has stimulating action at low concentration and depressing action at high concentration.

・ Toluene has no mutagenicity and no carcinogenicity is observed.

・ Case history: Although toluene is one of the most widely used solvents in industries, it is mostly used as mixed solvents and thus cases of exposure with toluene alone are rare. Symptoms mostly seen in workers handling organic solvents are headache, malaise in lower limbs etc. and subjective symptoms of workers who had been engaged in manufacturing of inks, paints and painting with them (concentration of toluene : 100 to 2,300 ppm) and who visited university hospitals were headache, vomiting, dizziness, palpitation etc. and other than these several cases of abnormal sensation in four limbs were observed. In a case of a housewife who had been engaged in painting as a private occupation and exposed with extremely high concentration of a mixed solvent the main component of which is toluene, the symptom was very severe beginning from malaise in the whole body, amnesia and vomiting. After 3 months of further work, degree of headache, coxalgia and choking became increased and electroencephalogram during hyperventilation showed a high tension slow wave group and a sharp wave. When the work was continued for further 3 months, the electroencephalogram even at rest began to show minor slow waves and the subjective symptoms became stronger. Within 7 months after stopping the work, the subjective symptoms and the abnormal electroencephalogram almost disappeared. In these periods no significant changes were observed in hemogram and liver function test results.

⑨ Chlorobenzene

1) Chlorobenzene is used for intermediates for dyestuffs, phenol and aniline, and solvent for paints and lacquers, raw materials for pharmaceuticals and fragrances, solvent for ethyl cellulose, heat transfer medium. The production volume in 1997 was 27,203 tons.

2) In the results of the fiscal year 1983 General Environmental Survey, chlorobenzene was detected in 12 out of 12 areas and 91 out of 91 samples (unified detection limit: 0.001 ppb).

3) In the results of this survey, chlorobenzene was detected in 10 out of 11 areas and 24 out of 32 samples, and the detection range was 20 to 160 ng/m3 (unified detection limit: 20 ng/m3).

4) From the above survey results, although the concentration level of chlorobenzene detected is not so high as to pose immediate problems, since the detection frequency is high, it is required in future to conduct environmental survey at a certain interval.

○ Survey results of chlorobenzene

	(samples)	(areas)	detection range	detection limit
FY1983	100%(91/91)	100%(12/12)	0.001 to 0.022 ppb	0.001 ppb
			(4.7 to 103 ng/m3)	(4.7 ng/m3)
FY1998	75%(24/32)	91%(10/11)	20 to 160 ng/m3	20 ng/m3

○ Results of acute toxicity tests etc. for chlorobenzene

・ rat	LD50 (oral)	1,100 mg/kg
・ mouse	LD50 (oral)	2,300 mg/kg
・ rabbit	LD50 (oral)	2,250 mg/kg

・When applied to skin, only medium grade erythema and slight necrosis of epithelium were observed even in continuous contact for a week. For eyes, it causes pain and slight fugitive symptom of irritation in conjunctiva.

・ Major symptoms are depression of central nervous system and anesthetic influence.

・ Nontoxic value (NOAEL) for dog in 13 weeks repeated oral administration for 5 days a week was 19 mg/kg/day, and the same for rat for 13 weeks was 250 mg/kg/day and for 2 years was 120 mg/kg/day. In each case target organ was liver and centrilobular hepatocellular disorder and necrosis was observed.

・ Mutagenicity: Negative in tests using TA98, TA100 and TA1537 strains, regardless of addition of S9-Mix.

⑩ o-Xylene

1) 0-Xylene is used for a raw material in organic syntheses. The production volume in 1997 was 212,355 tons.

2) In the results of this survey, o-xylene was detected in 14 out of 14 areas and 42 out of 42 samples, and the detection range was 330 to 9,500 ng/m3 (unified detection limit: 60 ng/m3).

3) From the above survey results, although the concentration level of o-xylene detected is not so high as to pose immediate problems, since the detection frequency and the production volume is high, it is required in future to conduct environmental survey at a certain interval and to endeavor to collect information.

○ Survey results of o-xylene

	(samples)	(areas)	detection range	detection limit
FY1998	100%(42/42)	100%(14/14)	330 to 9,500 ng/m3	60 ng/m3

○ Results of acute toxicity tests etc. for o-xylene

・ human	LCLo (inhalation)	6,125 ppm/12hr
・ rat	LDLo (oral)	5,000 mg/kg
	LCLo (inhalation)	6,125 ppm/12 hr
・ mouse	LD50 (oral)	30,000 mg/kg
	LD50 (intraperitoneal)	1,550 μl/kg

・Toxicity of o-xylene is considered to be substantially not different from those of other isomers and their mixtures. Although acute toxicity in experimental animals is relatively week, in human there is a report of death caused by exposure at high concentration. In take in body via oral and inhalation routes is high and it mainly causes depression in central nervous system, and exposure with large volume or in long term causes functional disorder in liver and kidney. Furthermore, it has irritancy against eyes, upper respiratory tract and skin, and dermatitis is developed by repeated and prolonged contact. For both human and animals, it has capability of placental transmission and there are reports that fetotoxicity and teratogenicity are observed in experimental animals. For human, although correlation between exposure during pregnancy and congenital malformation is suspected, many of the cases are by mixed exposure with various solvents and thus teratogenicity of xylenes is not clear.

・ Xylenes are not mutagenic and there is a report that xylenes are negative in animal carcinogenicity experiments using rats and mice. For human, although there is a report of epidemiological study which shows occurrence of marignant tumor in hematopoietic organs increases with exposure with xylenes, data suggesting correlation between the exposure and carcinogenesis are not sufficient, accordingly IARC classified this into Group 3.

・Case history: Since xylenes are used generally as a component of solvent mixture, poisoning cases of xylenes themselves is rare. In an indoor painting work in a narrow space using 90% xylene containing solvent, 1 out of 3 workers who had been exposed at such a high concentration as 10,000 ppm (estimated) died and the other two lost consciousness. Through oxygen inhalation the two recovered the consciousness after several hours, however, memories just before the loss of consciousness had been lost for both of them. For the case of death, the autopsy report described congestion, edema and interstitial concealed hemorrhage in lung, congestion and cytopathy in liver, minute hemorrhage and cytopathy due to oxygen deficiency in brain alba and cinerea.

⑪ m-Xylene + p-Xylene

1) m-Xylene is used for a raw material in organic syntheses, a raw material for

xylene-formaldehyde resin and solvent. p-Xylene is used as a raw material for organic syntheses and solvent. The production volume in 1997 was 2,927,704 tons (p-isomer).

2) In the results of this survey, m-xylene + p-xylene was detected in 14 out of 14 areas and 42 out of 42 samples, and the detection range was 550 to 35,000 ng/m3 (unified detection limit: 100 ng/m3).

3) From the above survey results, although the concentration level of m-xylene + p-xylene detected is not so high as to pose immediate problems, since the detection frequency and the production volume is high, it is required in future to conduct environmental survey at a certain interval and to endeavor to collect information.

○ Survey results of m-xylene + p-xylene

	(samples)	(areas)	detection range	detection limit
FY1998	100%(42/42)	100%(14/14)	550 to 35,000 ng/m3	100 ng/m3

○ Results of acute toxicity tests etc. for m-xylene

・ human	LCLo (inhalation)	424 mg/m3/6hr/6days
・ rat	LCLo (inhalation)	8,000 ppm/4hr
	LD50 (oral)	5,000 mg/kg
・ mouse	LC50 (inhalation)	2,010 ppm/24h

・Toxicity of m-xylene is considered to be substantially not different from those of other isomers and their mixtures. Although acute toxicity in experimental animals is relatively week, in human there is a report of death caused by exposure at high concentration. In take in body via oral and inhalation routes is high and it mainly causes depression in central nervous system, and exposure with large volume or in long term causes functional disorder in liver and kidney. Furthermore, it has irritancy against eyes, upper respiratory tract and skin, and dermatitis is developed by repeated and prolonged contact. For both human and animals, it has capability of placental transmission and there are reports that fetotoxicity and teratogenicity are observed in experimental animals. For human, although correlation between exposure during pregnancy and congenital malformation is suspected, many of the cases are by mixed exposure with various solvents and thus teratogenicity of xylenes is not clear.

・ Xylenes are not mutagenic and there is a report that xylenes are negative in animal carcinogenicity experiments using rats and mice. For human, although there is a report of epidemiological study which shows occurrence of marignant tumor in hematopoietic organs increases with exposure with xylenes, data suggesting correlation between the exposure and carcinogenesis are not sufficient, accordingly IARC classified this into Group 3.

・case history: Since xylenes are used generally as a component of solvent mixture, poisoning cases of xylenes themselves is rare. In an indoor painting work in a narrow space using 90% xylene containing solvent, 1 out of 3 workers who had been exposed at such a high concentration as 10,000 ppm (estimated) died and the other two lost consciousness. Through oxygen inhalation the two recovered the consciousness after several hours, however, memories just before the loss of consciousness had been lost for both of them. For the case of death, the autopsy report described congestion, edema and interstitial concealed hemorrhage in lung, congestion and cytopathy in liver, minute hemorrhage and cytopathy due to oxygen deficiency in brain alba and cinerea.

○ Results of acute toxicity tests etc. for p-xylene

・ rat	LD50 (oral)	5,000 mg/kg
	LC50 (inhalation)	4,550 ppm/4hr
	LD50 (intraperitoneal)	3,810 mg/kg
・ mouse	LC50 (inhalation)	15,000 mg/m3
	LD50 (intraperitoneal)	2,400 μg/kg

⑫ Styrene

1) Styrene is used for polystyrene, synthetic rubbers, unsaturated polyester resins, AS resins, ABS resins, ion exchange resins emulsions, synthetic resin colorants. The importation/production volume in 1997 was 3,102,667 tons.

2) In the results of this survey, styrene was detected in 14 out of 14 areas and 42 out of 42 samples, and the detection range was 39 to 2,700 ng/m3 (unified detection limit: 33 ng/m3).

3) From the above survey results, although the concentration level of styrene detected is not so high as to pose immediate problems, since the detection frequency and the production volume is high, it is required in future to conduct environmental survey at a certain interval and to endeavor to collect information.

○ Survey results of styrene

	(samples)	(areas)	detection range	detection limit
FY1998	100%(42/42)	100%(14/14)	39 to 2,700 ng/m3	33 ng/m3

○ Results of acute toxicity tests etc. for styrene

・ rat	LD50 (oral)	2,650 mg/kg
	LD50 (inhalation)	12 g/m3/4hr
・ mouse	LD50 (oral)	316 mg/kg

・ Instillation of 100 mg to eye of rabbits shows strong irritancy.

・ In 78 weeks experiments on Fischer 344 rats (doses: 500, 1,000, 2,000 mg/kg) (103 weeks for the low dose group) using stomach tube and on B6C3F_1 mice (doses: 150, 300 mg/kg) by oral administration, incidence rate of broncogenic carcinoma and pulmonary adenoma rose for male mice depending on doses, however no conclusion was reached on tumorigenicity when compared with the historical control. Taking into consideration of the findings on male mice and male and female rats also, it was concluded that from the experiments no evidence for tumorigenicity was obtained.

・ Mutagenicity: Negative in Ames tests (TA98, TA100, TA1535, TA1537, TA1538 strains). Negative in Chinese hamster tests (CHL, S9-Mix added).

⑬ Dichloromethane

1) Dichloromethane is used for paint remover, print board cleaner, metal degreasing agent, polyurethene blowing agent, aerosol propellant, low boiling solvents (flame resistant film, oil solution, resins, rubbers, wax, and blending materials for cellulose esters/ethers), reaction solvent for polycarbonate, coolant, lacquers, extraction for analysis of textiles, leathers, abd fragrances), linoleum, ink. The importation/production volume in 1997 was 109,881 tons.

2) In the survey of the fiscal year 1979 General Environmental Survey, dichloromethane was detected in 10 out of 17 areas and 25 out of 46 samples (detection limit: 0.006 to 10 ppb), and in FY 1980 it was detected in 18 out of 44 areas and 47 out of 135 samples (detection limit: 0.005 to 8 ppb), and in FY 1983 it was detected in 12 out of 12 areas and 99 out of 101 samples (detection limit: 0.001 to 0.01 ppb).

3) In the results of this survey, dichloromethane was detected in 14 out of 14 areas and 42 out of 42 samples and the detection range was 280 to 24,000 ng/m3 (unified detection limit: 70 ng/m3).

4) From the above survey results, detection frequency of dichloromethane is high and since the concentration level detected tends to rise compared with the previous survey results, it is required to conduct detailed environmental survey including surroundings of discharge sources and to observe the change and to make risk assessment at the same time.

○ Survey results of dichloromethane

	(samples)	(areas)	detection range	detection limit
FY1979	54%(25/46)	59%(10/17)	0.07 to 1.5 ppb	0.006 to 10 ppb
			(247 to 5,300 ng/m3)	(21.2 to 35,300 ng/m3)
FY1980	35%(47/135)	41%(18/44)	0.026 to 0.8 ppb	0.005 to 8 ppb
			(92 to 2,830 ng/m3)	(17.7 to 28,300 ng/m3)

FY1983	98%(99/101)	100%(12/12)	0.001 to 0.01 ppb (3.5 to 35 ng/m3)	0.002 to 5.6 ppb (7.1 to 19,800 ng/m3)
FY1998	100%(42/42)	100%(14/14)	280 to 24,000 ng/m3	70 ng/m3

○ Results of acute toxicity tests etc. for dihloromethane

・ human	LDLo (oral)	375 mg/kg
	TCLo (inhalation)	550 ppm/ 1year
	TCLo (inhalation)	500 ppm/8hr
・ rat	LD50 (oral)	1,600 mg/kg
	LC50 (inhalation)	52,000 ppm/m3
・ rabbit	LD50 (oral)	1,900 mg/kg
・ mouse	LD50 (intraperitoneal)	437 mg/kg

・ In an irritation test at 490 to 500 ppm, it caused slight irritanncy such as irritative reaction, cornea thickening, rise of intraocular pressure.

・ As for repeated dose animal experiments, effects on liver (centrilobular fatty change) by oral administration, and effects on liver by inhalation (fatty infiltration, liver weight increase, centrilobular edematous change), effects on immune system (fiblosation of rat spleen, atrophia of dog spleen) and effects on central nervous system (lowering of enzyme level of cerebellum for rat) were reported.

・ Mutagenicity: In many test systems it was reported as negative. But in vivo tests there were reports that inhalation of mice with higher than 4,000 ppm concentration for 10 days induced significantly sister cromatid exchange in pulmonary cells and peripheral blood, chromosomal abberation in pulmonary cells, and chromosomal abberation in bone marrow cells.

・ Reproductive toxicity: In experiments exposing mice and rats with 1,250 ppm, increase in abnormality in bone structure such as delay in sternum formation and condyloid sternum. In experiments exposing rats with 4,500 ppm, increase in liver weight of mother animals and decrease in body weight of fetuses were observed but no teratogenicity. In a long term two generation experiment using rats at 1,500 ppm, there were no major changes except lowering of body weight of mother animals.

・ Carcinogenicity: In oral dose experiments on mice at 60 to 250 mg/kg and on rats at 5 to 250 mg/kg, slight increase in rate of incidence of liver cell adenoma / carcinoma was observed in male mice and female rats, but no sufficient evidence of carcinogenicity was suggested. Furthermore, in 64 days oral administration tests on mice and rats at 500 mg/kg/day, it is reported that there was an increase in pulmonary tumor for male mice and in malignant tumor in lacteal gland for female rats. In the other hand in 2 years inhalation tests using rats at 500, 1,500, 3,500 ppm and 6 hrs a day and 5 days a week, there observed an increase in incidence rate or total number of incidence of benignant lacteal gland tumor for both male and female. And for male a tendency of increase in cervical sarcoma was observed.

・ Case history: A problem in workplace where dichloromethane is handled is drunkenness, which tends to cause casualty. At high exposure dizziness, vomiting, dysesthesia in four limbs etc. occurs and coma or drunkenness.

⑭ 1,2,4-Trimethylbenzene

1) 1,2,4-Trimethybenzene is used for syntheses of trimellitic acid vitamin E, intermediates for dyestuffs, pigments, pharmaceuticals and a raw material for pyromellitic acid via durene (after methylation). The importation/production volume in 1997 was 3,000 tons (estimated).

2) In the results of this survey, 1,2,4-trimethybenzene was detected in 13 out of 14 areas and 39 out of 42 samples, and the detection range was 370 to 10,000 ng/m3 (unified detection limit: 370 ng/m3).

3) From the above survey results, since the detection frequency is high and the concentration level detected is relatively high, it is required in future to conduct environmental survey and to observe the change and to endeavor to collect information.

○ Survey results of 1,2,4-trimethylbenzene

	(samples)	(areas)	detection range	detection limit
FY1998	93%(39/42)	93%(13/14)	370 to 10,000 ng/m3	370ng/m3

○ Results of acute toxicity tests etc. for 1,2,4-trimethylbenzene

・ rat	LD50 (oral)	5,000 mg/kg
・ mouse	LD50 (intraperitoneal)	1,752 mg/kg

⑮ 1,3,5-Trimethylbenzene

1) 1,3,5-Trimethybenzene is used for dyestuffs, pigments, pharmaceuticals and industrial chemicals.

2) In the results of this survey, 1,3,5-trimethybenzene was detected in 13 out of 13 areas and 38 out of 38 samples, and the detection range was 90 to 3,200 ng/m3 (unified detection limit: 40 ng/m3).

3) From the above survey results, since the detection frequency is high and the concentration level detected is relatively high, it is required in future to conduct environmental survey and to observe the change and to endeavor to collect information.

○ Survey results of 1,3,5-trimethylbenzene

	(samples)	(areas)	detection range	detection limit
FY1998	100%(38/38)	100%(13/13)	90 to 3,200 ng/m3	40ng/m3

○ Results of acute toxicity tests etc. for 1,3,5-trimethylbenzene

・ human	LDLo (inhalation)	100 ppm
・ rat	LC50 (inhalation)	24 g/m3/4hr

⑯ Polychlorinated naphthalenes

1) In the results of this survey, polychlorinated naphthalenes were detected in 14 out of 14 areas and 42 out of 42 samples, and the detection range was 0.011 to 0.86 ng/m3.

2) From the above survey results, since the detection frequency is high and the substances are chemical substances structures of which are similar to PCBs, it is required in future to conduct environmental survey and to observe the change and to endeavor to collect information.

○ Survey results of polychlorinated naphthalenes

	(samples)	(areas)	detection range
FY1998	100%(42/42)	100%(14/14)	0.011 to 0.86 ng/m3

○ Results of acute toxicity tests etc. for polychlorinated naphthalenes

・ 1-chloronaphthalene

・ rat	LD50 (oral)	1,540 mg/kg
・ mouse	LD50 (oral)	1,091 mg/kg

・ 2-chloronaphthalene

・ rat	LD50 (oral)	2,078 mg/kg
・ mouse	LD50 (oral)	886 mg/kg

・ trichloronaphthalene

・ human	TCLo (inhalation)	30 mg/kg

・ For human, chloracne is known professionally and experimentally.

・ Case history: It was in the ages of World War I, when chloronaphthalenes were started to be used as a water proof agent and there were reports already in 1918 on frequent occurrence of chloracne in workers handling the substances. Since about 1937 highly chlorinated compounds were used as an insulating oil and incidence of hepaopathy accompanying icterus was reported. Among 3 of the deads 2 were exposed with pentachloro- and hexachloronaphthalene and 1 was exposed with vapor of wax containing tetrachloro- and pentachloronaphthalene and several %of PCBs. In Japan the first report was issued in 1938 on dermal disturbance of workers handling the substances.

⑰ Tris (2-chloroethyl) phosphate

1) Tris(2-chloroethyl) phosphate is used for flame retardant of polyvinyl chloride, polyurethane foam, epoxy-resins and polyesters.

2) In the survey of the fiscal year 1993 General Environmental Survey, tris(2-chloroethyl) phosphate was detected in 8 out of 13 areas and 21 out of 39 samples (unified detection limit: 1 ng/m3).

3) In the results of this survey, tris(2-chloroethyl) phthalate was detected in 12 out of 15 areas and 24 out of 37 samples and the detection range was 0.3 to 1.4 ng/m3 (unified detection limit: 0.24 ng/m3).

4) From the above survey results, detection frequency of tris(2-chloroethyl) phthalate is high, it is required in future to conduct environmental survey and to observe the change and to endeavor to collect information at the same time.

○ Survey results of tris(2-chloroethyl) phthalate

	(samples)	(areas)	detection range	detection limit
FY1993	54%(21/39)	62%(8/13)	1 to 7.4 ng/m3	1 ng/m3
FY1998	65%(24/37)	80%(12/15)	0.3 to 1.4 ng/m3	0.24 ng/m3

○ Results of acute toxicity tests etc. for tris(2-chloroethyl) phosphate

・ rat	LD50 (oral)	1,230 mg/kg
・mouse	LD50 (oral)	1,866 mg/kg
	LD50 (intraperitoneal)	250 mg/kg

⑱ Tributyl phosphate

1) Tributyl phosphate is used for vinyl butylal, solvents, metal extractants, plasticizers and softening agents of synthetic rubbers, antifoaming agents in textile processing for paper mills.

2) In the survey of the fiscal year 1993 General Environmental Survey, tributyl phosphate was detected in 6 out of 14 areas and 9 out of 39 samples (unified detection limit: 1 ng/m3).

3) In the results of this survey, tris(2-chloroethyl) phthalate was detected in 13 out of 15

areas and 29 out of 40 samples and the detection range was 0.22 to 7.5 ng/m3 (unified detection limit: 0.2 ng/m3).

4) From the above survey results, detection frequency of tributyl phthalate is high, it is required to conduct environmental survey in future and to observe the change and to endeavor to collect information.

○ Survey results of tributyl phthalate

	(samples)	(areas)	detection range	detection limit
FY1993	23%(9/39)	43%(6/14)	1.2 to 45 ng/m3	1 ng/m3
FY1998	73%(29/40)	87%(13/15)	0.22 to 7.5 ng/m3	0.2 ng/m3

○ Results of acute toxicity tests etc. for tributyl phosphate

・ rat	LD50 (oral)	3,000 mg/kg
	LC50 (inhalation)	28,000 mg/m3/1hr
・mouse	LD50 (oral)	1,189 mg/kg
	LC50 (inhalation)	1,300 mg/m3
	LD50 (intraperitoneal)	159 mg/kg

・ Local irritancy is strong and irritates eyes, skins or respiratory organs.

・ This is a cholinesterase inhibitor and dizziness, headache, ptyalism, miosis etc. are seen. Furthermore, inhalation of vapor causes pulmonary edema and since the pulmonary edema occurs 2 to 3 hours after exposure, rest and observation of the progress in this period are important.

・ In a 14 days repeated dose experiment at doses 0, 0.14, 1.42 ml/kg, once a day, no significant changes were observed except for change in seminiferous tubule of testis seen for 0.42 ml/kg group in histological investigation. As for the experiment at 0, 0.28, 0.42 ml/kg, lowering of nerve conduction velocity at tail nerve was observed for 0.42 ml/kg group.

・ Tumorigenicity: In a 18 weeks repeated oral dose experiment on rat at 0, 200, 300, 350 ml/kg/day doses, hyperplasia of bladder epitherium was observed for both male and female of administered groups. However, no malignant tumor were found.

⑲ Tricresyl phosphate

1) Tricresyl phosphate is used for plasticizer of vinyl polymer film for agriculture, electrical wire compounds and vinyl polymers for building use, softner for synthetic rubber compounds, plasticizers, and other flame retardants, flame resistant working fluid, gasoline additives and lubicants additives. The importation/production volume for 1997 was 17,426 tons(as phosphates plasticizers).

2) In the survey of the fiscal year 1993 General environmental survey, tricresyl phosphate was detected in 4 out of 14 areas and 7 out of 42 samples (unified detection limit: 3 ng/m3).

3) In the results of this survey, tricresyl phosphate was detected in 5 out of 16 areas and 8 out of 46 samples and the detection range was 1.2 to 2.6 ng/m3 (unified detection limit: 1 ng/m3).

4) From the above survey results, detection frequency of tricresyl phthalate is low, and it does not seem to pose any problems now.

○ Survey results of tricresyl phthalate

	(samples)	(areas)	detection range	detection limit
FY1993	17%(7/42)	29%(4/14)	3 to 17 ng/m3	3ng/m3
FY1998	17%(8/46)	31%(5/16)	1.2 to 2.6 ng/m3	1 ng/m3

○ Results of acute toxicity tests etc. for tricresyl phosphate

・ human	LDLo (oral)	1,800 mg/kg
・ rat	LD50 (oral)	3,000 mg/kg
・mouse	LD50 (oral)	3,900 mg/kg
・ rabbit	LD50 (oral)	100 mg/kg

・ Center of toxicity is neuropathy of peripheral nervous system. When orally ingested, the incipient symptom is gastrointestinal trouble and several hours later nausea, vomiting, abdominal pain, diarrhea etc. start and these symptoms fade out in 1 to several days. Then appears after 10 to 20 days of latent period peripheral dominant dyskinesia(acute retardative neurotoxicity).

・ Tumorigenicity: In a long term oral administration experiment using rats and mice, no tumorigenicity was observed for each group of male and female rats and male and female mice.

・ Reproductive toxicity: In a repeated oral dose experiment on rats at max. 350 mg/kg/day at the 6 to 18 day of pregnancy, no teratogenicity was observed even at the dose toxic to mother animals. No toxicity to fetuses were also found.

・ Mutagenicity: Negative in Ames tests using TA98, TA100, TA1535 and TA1537 regardless of addition of S9-Mix.

・ Case history: In a case where about 1.8 liter of olive oil estimated to contain max. 1.59% of the substance was consumed for cooking by a family of 6 members in about 1.5 months beginning the beginning of December, the whole family presented the symptom. In the worst case (for the17years old, man), at the end of January pain at triceps surae and gait disorder occurred and in the middle of February walking became impossible. Amyotrophia in lower limbs and feet were observed and movement of feet were impossible. Dyskinesia of knee joint was slight and no abnormality was found in hip joint. As for upper limbs, there were no disturbance in movement of shoulder and cubital joint but there was a slight disorder in wrist joint and it was impossible to throw strength in fingers. But, no amyotrophia was observed. In mid March patellar reflex was accentuated and became convulsive and sustained clonus in ancons appeared, and amyotrophia in lower limbs and hands became significant. There was no disturbance in bladder and rectum. In July gradual improvement was seen and walking became possible with the help of a stick. Even a year after the occurrence, movement of ankles was impossible, although feet could be moved slightly. In this case the patient died of an accident 11 years after occurrence and the autopsy confirmed that there was a significant degeneration in pyramidal tracts of spinal cord. For the other cases the symptom of which was slight at the time of occurrence, 3 cases were completely cured but for others symptom on pyramidal tract of lower limbs was significant and in a part damage in peripheral nervous system remained. The olive oil was the cause of this case and this was confirmed by an experiment where the above olive oil was fed to hens and neuropathy in peripheral nervous system could be created.

Cases similar to the above occurred frequently in Morocco in 1959. Number of the patients is at least more than 2,000 and it is concluded that this was caused because lubricating oil for jet engines containing this substance was used for cooking. As for the symptoms, the incipient symptom were pain in lower limbs and then after lowering of sensation at the end of four limbs. In a couple of days the lowering of sensation was recovered but then dyskinesia appeared above all in the end of lower limbs, and sometime dyskinesia in hands was seen. Amyotrophia was not rare. Systemic symptom was not clear but in one third of the patients diarrhea was observed prior to occurrence of the disease.

⑳ Bis(2-ethylhexyl) adipate

1) Bis(2-ethyhexyl) adipate is used for plasticizer of polyvinyl chloride (leather, film, sheet, hose, gloves for industrial use), softner for synthetic rubber (hose, sealants), synthetic lubricant. The importation/production volume for 1997 was 33,282 tons(as total adipates plasticizers).

2) In the survey of the fiscal year 1984 General Environmental Survey, bis(2-ethylhexyl) adipate was detected in 11 out of 12 areas and 47 out of 72 samples (detection limit: 0.1 to 0.61 ng/m3) and in FY 1995 it was detected in 13 out of 14 areas and 31 out of 41 samples (unified detection limit: 1 ng/m3).

3) In the results of this survey, bis(2-ethylhexyl) adipate was detected in 11 out of 12 areas and 26 out of 33 samples and the detection range was 1.0 to 26 ng/m3 (unified detection limit: 1 ng/m3).

4) From the above survey results, detection frequency of bis(2-ethylhexyl) adipate is high, and since the results of this survey shows similar results in FY 1995, it is required to conduct in future environmental survey and to observe the change and at the same time to make risk assessment. Furthermore, since it is pointed out that the substance is suspected to have endocrine disruptive effects, endeavor to collect information is required.

○ Survey results of bis(2-ethylhexyl) adipate

	(samples)	(areas)	detection range	detection limit
FY1984	65%(47/72)	92%(11/12)	0.23 to 16.7 ng/m3	0.1 to 0.61 ng/m3
FY1995	76%(31/41)	93%(13/14)	1.0 to 22 ng/m3	1 ng/m3
FY1998	79%(26/33)	92%(11/12)	1.0 to 26 ng/m3	1 ng/m3

○ Results of acute toxicity tests etc. for bis(2-ethylhexyl) adipate

・ rat LD50 (oral) 9,100 mg/kg

・mouse LD50 (oral) 15,000 mg/kg

・ General toxicity of this substance is extremely weak and in a test of intraperitoneal administration of large amount of the substance to mice and in a test of application of the substance itself to human skin, no change was observed. And in a 1 month feeding test on rats at the concentration of 0.5, 2.0 and 5.0% of the food and in a 2 months oral administration tests on dogs at 2g/kg/day, no abnormality including histopathological examination were observed except for suppression in growth seen for 5% dose group rats. Additionaly, in a 13 weeks experiment where rats and mice were fed with the food to which the substance was added at 0 to 25,000 ppm concentration, no abnormality were observed in both macroscopic finding and histological examination.

・ Tumorigenicity: In an experiment where F344 rats and B6C3F1 mice were fed for 103 weeks with food containing the substance at 0, 1,000 and 2,500 mg/m3 and sacrificed at the 104th and 107th week and examined, tumorigenicity was not found for rats. But for male mice hepatocellular carcinoma (7/50, 12/49, 12/49) and hepatocellular adenoma (1/50, 8/49, 15/49) were observed and for female mice hepatocellular caricinoma (1/50, 14/49, 12/49) and hepatocellular adenoma (2/50, 5/50, 6/50). Consequently, it was concluded that the substance is irrevocably tumorigenic for female mouse (occurrence of hepatocellular carcinoma) and is probably tumorigenic for male mouse (occurrence of hepatocellular adenoma).

・ Negative in Ames tests (TA98, TA100, TA1535, TA1538).

・ Reproductive/developmental toxicity: In an experiment where several adipate esters were intraperitoneally administered to rats on the 5th, 10th and 15th day of pregnancy, toxicity on fetuses were observed and NOEL is estimated to be about 1/30th of LD50. And it was observed that intraperitoneal single dose administration of 9,200 mg/kg of the substance to male mice lowered the reproductive ability.

(21) 1-Methylnaphthalene, 2-Methylnaphthalene

・ 1-Methylnaphthalene

1) 1-Methylnaphthalene is used for a raw material for organic syntheses and heating medium.

2) In the survey of the fiscal year 1984 General Environmental Survey, 1-methylnaphthlene was detected in 12 out of 12 areas and 65 out of 72 samples (detection limit: 0.4 to 5 ng/m3) .

3) In the results of this survey, 1-methylnaphthlene was detected in 10 out of 10 areas and 29 out of 30 samples and the detection range was 5.1 to 150 ng/m3 (unified detection limit: 2 ng/m3).

4) From the above survey results, the concentration level detected for 1-methylnaphthalene is not so high as to pose immediate problems but since the detection frequency is high and the results of this survey shows similar results in FY 1984, it is required in future to conduct environmental surveys at a certain interval and at the same time to endeavor to collect information.

○ Survey results of 1-methylnaphthalene

	(samples)	(areas)	detection range	detection limit
FY1984	90%(65/72)	100%(12/12)	1.9 to 280 ng/m3	0.4 to 5 ng/m3
FY1998	97%(29/30)	100%(10/10)	5.1 to 150 ng/m3	2 ng/m3

○ Results of acute toxicity tests etc. for 1-methylnaphthalene

・ rat	LD50 (oral)	1,840 mg/kg

・ 2-Methylnaphthalene

1) 2-Methylnaphthalene is used for heating medium and vitamin K_3.

2) In the survey of the fiscal year 1984 General Environmental Survey, 2-methylnaphthlene was detected in 12 out of 12 areas and 66 out of 72 samples (detection limit: 0.5 to 8 ng/m3) .

3) In the results of this survey, 2-methylnaphthlene was detected in 10 out of 10 areas and 30 out of 30 samples and the detection range was 3.2 to 310 ng/m3 (unified detection limit: 1.7 ng/m3).

4) From the above survey results, the concentration level detected for 2-methylnaphthalene is not so high as to pose immediate problems but since the detection frequency is high and the results of this survey shows similar results in FY 1984, it is required in future to conduct environmental surveys at a certain interval and at the same time to endeavor to collect information.

○ Survey results of 2-methylnaphthalene

	(samples)	(areas)	detection range	detection limit
FY1984	92%(66/72)	100%(12/12)	2.6 to 530 ng/m3	0.5 to 8 ng/m3
FY1998	100%(30/30)	100%(10/10)	3.2 to 310 ng/m3	1.7 ng/m3

○ Results of acute toxicity tests etc. for 2-methylnaphthalene

- rat LD50 (oral) 1,630 mg/kg

(22) 1,2-Dimethylnaphthalene, 1,3-+1,6-Dimethylnaphthalene, 1,4-Dimethylnaphthalene, 1,5-Dimethylnaphthalene, 1,7-Dimethylnaphthalene, 1,8-Dimethylnaphthalene, 2,3-Dimethylnaphthalene, 2,6-Dimethylnaphthalene, 2,7-Dimethylnaphthalene

1) Dimethylnaphthalenes are used for solvents, ore floatation agent, heating media.

2) In the results of this survey,

- 1,2-dimethylnaphthalene was detected in 10 out of 10 areas and 28 out of 30 samples and the detection range was 0.37 to 9.9 ng/m3 (unified detection limit: 0.3 ng/m3).
- 1,3-+1,6-dimethylnaphthalene was detected in 9 out of 9 areas and 26 out of 27 samples and the detection range was 2.0 to 70 ng/m3 (unified detection limit: 0.56 ng/m3).
- 1,4-dimethylnaphthalene was detected in 10 out of 10 areas and 29 out of 30 samples and the detection range was 0.27 to 7.2 ng/m3 (unified detection limit: 0.23 ng/m3).
- 1,5-dimethylnaphthalene was detected in 10 out of 10 areas and 28 out of 30 samples and the detection range was 0.4 to 8.9 ng/m3 (unified detection limit: 0.33 ng/m3).
- 1,7-dimethylnaphthalene was detected in 9 out of 9 areas and 27 out of 27 samples and the detection range was 0.13 to 23 ng/m3 (unified detection limit: 0.1 ng/m3).
- 1,8-dimethylnaphthalene was detected in 7 out of 7 areas and 21 out of 21 samples and the detection range was 0.09 to 51 ng/m3 (unified detection limit: 0.08 ng/m3).
- 2,3-dimethylnaphthalene was detected in 10 out of 10 areas and 28 out of 30 samples and the detection range was 0.4 to 13 ng/m3 (unified detection limit: 0.4 ng/m3).
- 2,6-dimethylnaphthalene was detected in 9 out of 9 areas and 26 out of 27 samples and the detection range was 1.2 to 30 ng/m3 (unified detection limit: 0.61 ng/m3).
- 2,7-dimethylnaphthalene was detected in 9 out of 9 areas and 27 out of 27 samples and the

detection range was 0.31 to 22 ng/m3 (unified detection limit: 0.3 ng/m3).

3) From the above results, since the detection frequency is high for dimethylnaphthalenes, it is required in future to conduct environmental surveys and to observe the change and at the same time to endeavor to collect information.

○ Survey results of 1,2-dimethylnaphthalene

	(samples)	(areas)	detection range	detection limit
FY1998	93%(28/30)	100%(10/10)	0.37 to 9.9 ng/m3	0.3 ng/m3

○ Survey results of 1,3-+1,6-dimethylnaphthalene

	(samples)	(areas)	detection range	detection limit
FY1998	96%(26/27)	100%(9/9)	2.0 to 70 ng/m3	0.56 ng/m3

○ Survey results of 1,4-dimethylnaphthalene

	(samples)	(areas)	detection range	detection limit
FY1998	97%(29/30)	100%(10/10)	0.27 to 7.2 ng/m3	0.23 ng/m3

○ Survey results of 1,5-dimethylnaphthalene

	(samples)	(areas)	detection range	detection limit
FY1998	93%(28/30)	100%(10/10)	0.4 to 8.9 ng/m3	0.33 ng/m3

○ Survey results of 1,7-dimethylnaphthalene

	(samples)	(areas)	detection range	detection limit
FY1998	100%(27/27)	100%(9/9)	0.13 to 23ng/m3	0.1 ng/m3

○ Survey results of 1,8-dimethylnaphthalene

	(samples)	(areas)	detection range	detection limit
FY1998	100%(21/21)	100%(7/7)	0.09 to 5.1 ng/m3	0.08 ng/m3

○ Survey results of 2,3-dimethylnaphthalene

	(samples)	(areas)	detection range	detection limit
FY1998	93%(28/30)	100%(10/10)	0.4 to 13 ng/m3	0.4 ng/m3

○ Survey results of 2,6-dimethylnaphthalene

	(samples)	(areas)	detection range	detection limit
FY1998	96%(26/27)	100%(9/9)	1.2 to 30 ng/m3	0.61 ng/m3

○ Survey results of 2,7-dimethylnaphthalene

	(samples)	(areas)	detection range	detection limit
FY1998	100%(27/27)	100%(9/9)	0.31 to 22 ng/m3	0.3 ng/m3

○ Results of acute toxicity tests etc. for 1,2-dimethylnaphthalene

・ 1,2-Dimethylnaphthalene added to water at 3 ppm concentration (reduced to 0.8 to 1.6 ppm in 6 days) showed toxicity to sea urchins and fish spawns. But its toxic degree is weaker than that of 1,3- isomer and is stronger than that of 1,4-isomer.

・ Carcinogenicity: There is a report of negative.

○ Results of acute toxicity tests etc. for 1,3-dimethylnaphthalene

・ 1,3-Dimethylnaphthalene added to water at 3 ppm concentration (reduced to 0.8 to 1.6 ppm in 6 days) showed toxicity to sea urchins and fish spawns. Its toxic degree is the strongest of 1,2-, 1,4- , 1,6- and 1,8- isomers.

・ Carcinogenicity: There is a report of negative.

・ Mutagenicity: Negative in Ames tests and the tests using yeast.

○ Results of acute toxicity tests etc. for 1,4-dimethylnaphthalene

・ 1,4-Dimethylnaphthalene added to water at 3 ppm concentration (reduced to 0.8 to 1.6 ppm in 6 days) showed toxicity to sea urchins and fish spawns. But its toxic degree is weaker than that of 1,2- and 1,3-isomers and is almost same as that of 1,6- and 1.8-isomers.

・ Carcinogenicity: There is a report of negative.

○ Results of acute toxicity tests etc. for 1,5-dimethylnaphthalene

・ Carcinogenicity: There is a report of negative.

○ Results of acute toxicity tests etc. for 2,3-dimethylnaphthalene

・ Carcinogenicity: There is a report of negative.

○ Results of acute toxicity tests etc. for 2,6-dimethylnaphthalene

・ Carcinogenicity: There is a report of negative.

○ Results of acute toxicity tests etc. for 2,7-dimethylnaphthalene

・ Carcinogenicity: There is a report of negative.

(23) Crotonaldehyde

1) Crotonaldehyde is used for raw material for chemicals such as butanol, crotonic acid, sorbic acid and pharmaceuticals. The production volume for 1997 was 8,000 tons (estimated).

2) In the survey of the fiscal year 1987 General Environmental Survey, crotonaldehyde was not detected (unified detection limit: 800 ng/m3). And in FY 1995 it was detected in 1 out of 18 areas and 3 out of 54 samples (unified detection limit: 3,000 ng/m3) and in FY 1997 it was detected in 1 out of 14 areas and 1 out of 42 samples (unified detection limit: 1,000 ng/m3).

3) In the results of this survey, crotonaldehyde was detected in 8 out of 10 areas and 21 out of 29 samples and the detection range was 15 to 330 ng/m3 (unified detection limit: 15 ng/m3).

4) From the above survey results, detection frequency of crotonaldehyde is high, and since the concentration level detected is relatively high, it is required to conduct in future more detailed environmental survey and to observe the change and at the same time to make risk assessment.

○ Survey results of crotonaldehyde

	(samples)	(areas)	detection range	detection limit
FY1987	0%(0/61)	0%(0/10)	not detected	800 ng/m3
FY1995	6%(3/54)	6%(1/18)	3,600to 5,200 ng/m3	3,000 ng/m3
FY1997	2%(1/42)	7%(1/14)	1,600 ng/m3	1,000 ng/m3
FY1998	72%(21/29)	80%(8/10)	15 to 330 ng/m3	15 ng/m3

○ Results of acute toxicity tests etc. for crotonaldehyde

・ rat LD50 (oral) 206 mg/kg

・mouse LD50 (oral) 104 mg/kg

・ Tumorigenicity: In a 113 week experiment where rats were bred with water to which crotonaldehyde was added at 0, 0.6, 6.0 mM, hepatocellular carcinoma was observed for 2 out of 27 rats in the 0.6 mM dose group and for 9 rats including the above neoplasmic nodus in liver was observed. But no tumor was observed for 0.6mM group.

・ Mutagenicity: Positive in Ames test using TA100 with or without addition of S9Mix. But negative with TA98, TA1535, TA1537 and TA1538 under both conditions.

Fig. 2-1 Locations of the Environmental Survey for Water (Fiscal Year 1998)

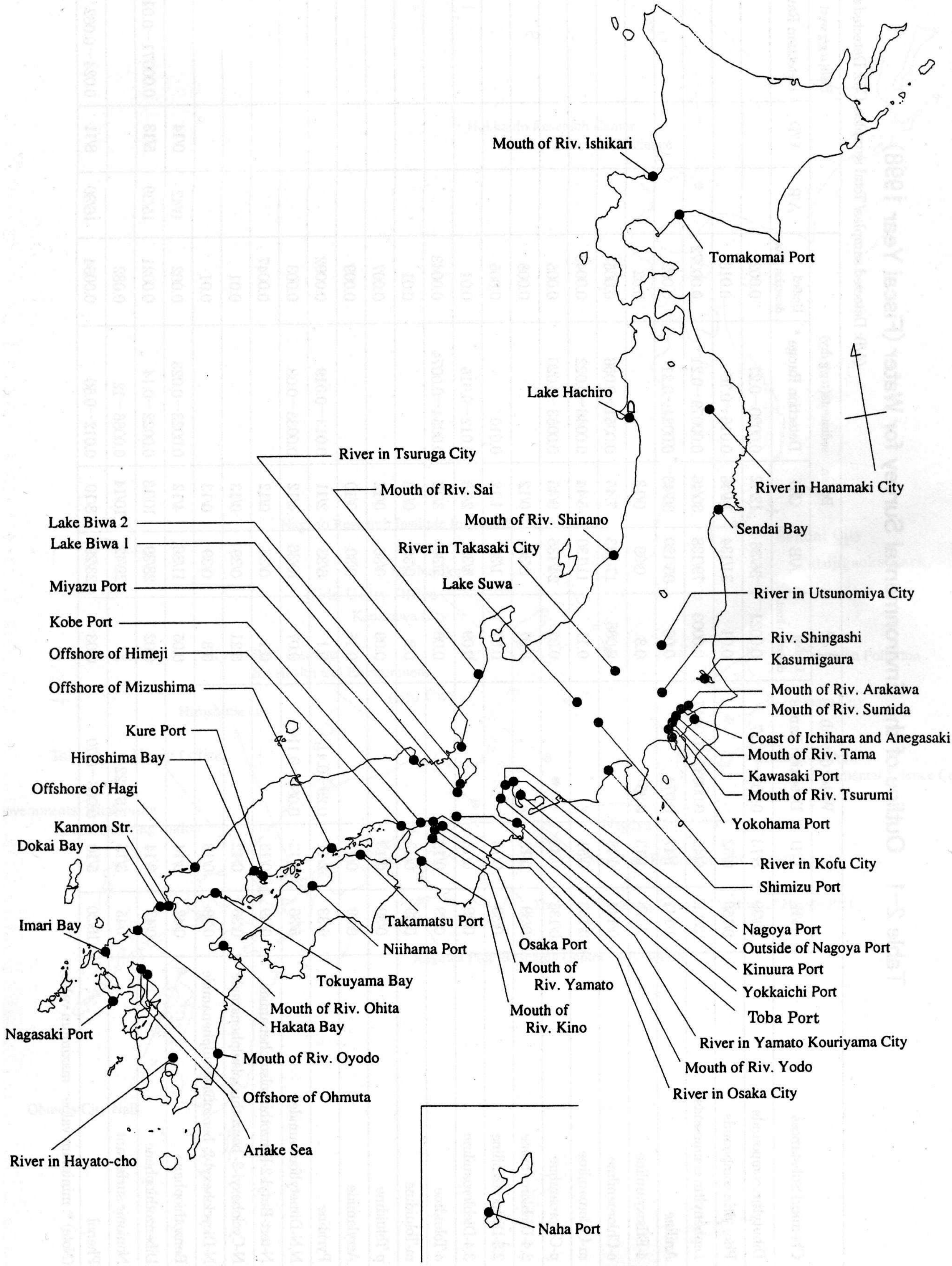


Table 2-1 Outline of the Environmental Survey for Water (Fiscal Year 1998)

(A/B: Detected samples/ Total samples, C/D: Detected areas/ Total areas)

Chemical Substances	Water (ng/ml)				Botom sediments(μg/g dry)				Fish(μg/g wet)			
	A/B	C/D	Detection Range *	Unified detection limit	A/B	C/D	Detection Range *	Unified detection limit	A/B	C/D	Detection Range *	Unified detection limit
Dibutyltin compounds	20/39	8/13	0.003−0.017	0.0021	36/36	12/12	0.0020−0.27	0.002				
Phenyltin compounds	0/156	0/52		0.01	31/134	14/46	0.016−0.76	0.016				
Diphenyltin compounds	12/133	6/45	0.00037−0.0017	0.0003	79/138	30/46	0.00079−0.21	0.00072				
Aniline	1/141	1/47	0.074	0.06	95/120	36/43	0.0021−0.21	0.002				
4-Ethoxyaniline	1/39	1/13	0.36	0.3	0/39	0/13		0.02				
o-Chloroaniline	0/144	0/48		0.088	17/133	7/45	0.0051−0.056	0.005				
m-Chloroaniline	0/153	0/51		0.11	11/130	5/44	0.0046−0.022	0.0045				
p-Chloroaniline	0/135	0/45		0.07	24/135	9/45	0.0053−0.020	0.005				
2,4-Dichloroaniline	0/39	0/13		0.07	0/36	0/12		0.008				
2,5-Dichloroaniline	0/39	0/13		0.07	1/36	1/12	0.010	0.005				
3,4-Dichloroaniline	0/39	0/13		0.09	4/39	2/13	0.012−0.015	0.01				
o-Toluidine	0/39	0/13		0.08	7/36	3/12	0.0054−0.0074	0.0043				
m-Toluidine	0/39	0/13		0.2	0/39	0/13		0.01				
p-Toluidine	0/39	0/13		0.09	0/36	0/12		0.007				
Acrylamide	0/39	0/13		0.15	0/30	0/10		0.009				
Pyridine	6/33	2/11	0.29−0.41	0.1	6/33	2/11	0.013−0.019	0.0092				
N,N-Dimetylformamide	5/36	2/12	0.080−0.110	0.07	10/36	4/12	0.0033−0.03	0.003				
N-tert-Butyl-2-benzothiazolsulphenamide	0/39	0/13		0.1	0/36	0/12		0.0047				
N-Cyclohexyl-2- benzothiazolsulphenamide	0/36	0/12		0.21	0/39	0/13		0.01				
N-Dicyclohexyl-2- benzotiazolsulphenamide	0/39	0/13		0.3	0/39	0/13		0.01				
Benzothiophene	0/42	0/14		0.05	11/36	4/12	0.0023−0.023	0.002	0/42	0/14		0.001
Dibenzothiophene	0/42	0/14		0.02	28/39	10/13	0.0022−0.14	0.0021	15/39	5/13	0.00071−0.013	0.00034
Nonionic surfactant	7/45	3/15	3.5−22	3	29/42	10/14	0.0086−12	0.082				
Phenol	15/30	5/10	0.066−0.70	0.03	23/29	8/10	0.012−0.50	0.0054	16/30	8/11	0.024−0.062	0.02

(Note) *: minimum value−maximum value

Fig. 2-2 Locations of the Environmental Survey for Air (Fiscal Year 1998)

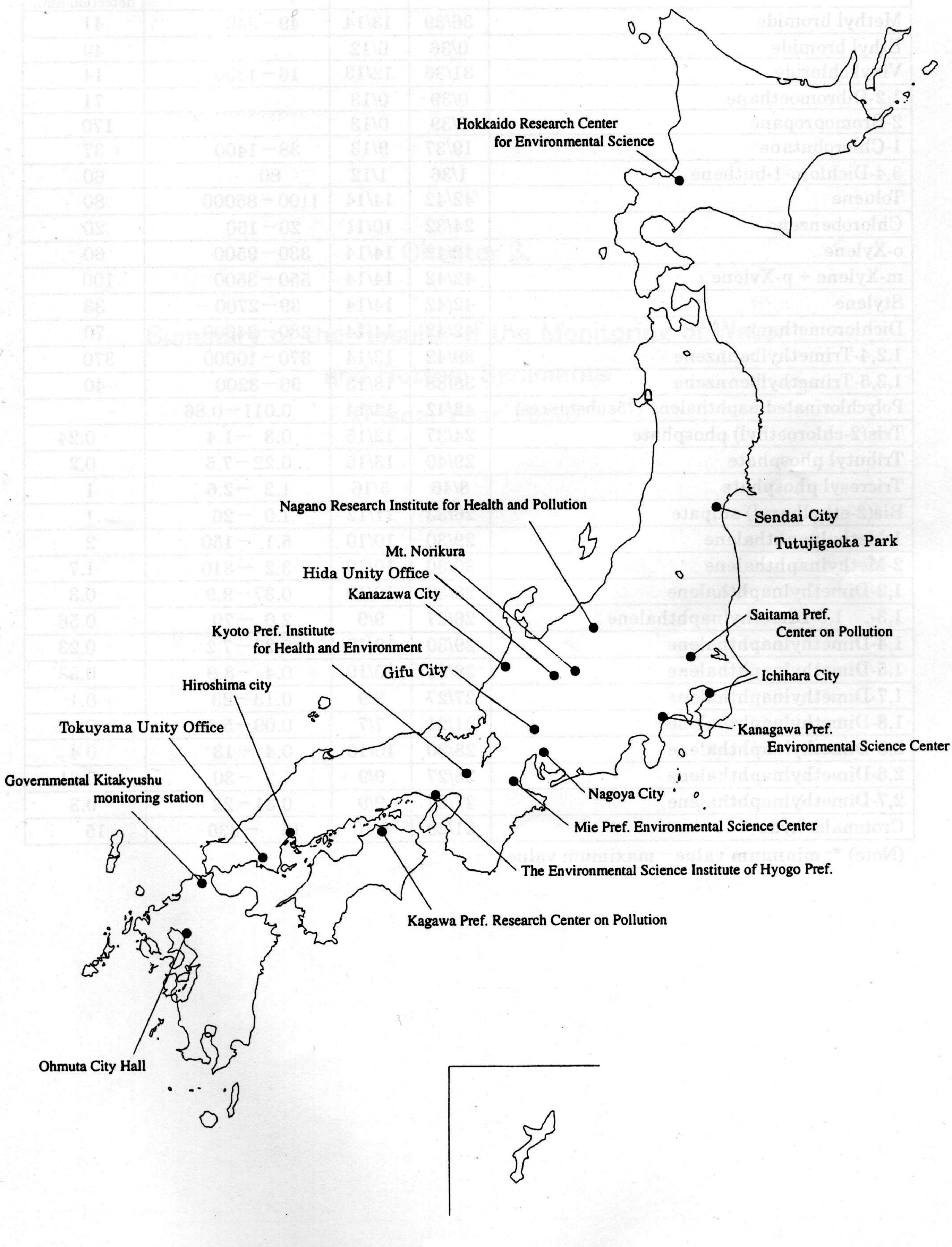


Table 2-2 Outline of the Environmental Survey for Air (Fiscal Year 1998)

Unit : ng/m^3 (A/B: Detected samples/ Total samples, C/D: Detected areas/ Total areas)

Chemical Substances	A/B	C/D	Detection Range *	Unified detection limit
Methyl bromide	36/39	13/14	49－340	41
Ethyl bromide	0/36	0/12		40
Vinyl chloride	31/36	12/13	16－1300	14
1,2-Dibromoethane	0/39	0/13		71
2-Bromopropane	0/39	0/13		170
1-Chlorobutane	19/37	9/13	38－1400	37
3,4-Dichloro-1-buthene	1/36	1/12	80	60
Toluene	42/42	14/14	1100－85000	80
Chlorobenzene	24/32	10/11	20－160	20
o-Xylene	42/42	14/14	330－9500	60
m-Xylene + p-Xylene	42/42	14/14	550－3500	100
Stylene	42/42	14/14	39－2700	33
Dichloromethane	42/42	14/14	280－24000	70
1,2,4-Trimethylbennzene	39/42	13/14	370－10000	370
1,3,5-Trimethylbennzene	38/38	13/13	90－3200	40
Polychlorinated naphthalene (75substances)	42/42	14/14	0.011－0.86	
Tris(2-chloroethyl) phosphate	24/37	12/15	0.3 －1.4	0.24
Tributyl phosphate	29/40	13/15	0.22－7.5	0.2
Tricresyl phosphate	8/46	5/16	1.2 －2.6	1
Bis(2-ethylhexyl) adipate	26/33	11/12	1.0 －26	1
1-Methylnaphthalene	29/30	10/10	5.1 －150	2
2-Methylnaphthalene	30/30	10/10	3.2 －310	1.7
1,2-Dimethylnaphthalene	28/30	10/10	0.37－9.9	0.3
1,3-, 1,6-Dimethylnaphthalene	26/27	9/9	2.0 －70	0.56
1,4-Dimethylnaphthalene	29/30	10/10	0.27－7.2	0.23
1,5-Dimethylnaphthalene	28/30	10/10	0.4 －8.9	0.33
1,7-Dimethylnaphthalene	27/27	9/9	0.13－23	0.1
1,8-Dimethylnaphthalene	21/21	7/7	0.09－5.1	0.08
2,3-Dimethylnaphthalene	28/30	10/10	0.4 －13	0.4
2,6-Dimethylnaphthalene	26/27	9/9	1.2 －30	0.61
2,7-Dimethylnaphthalene	27/27	9/9	0.31－22	0.3
Crotonaldehyde	21/29	8/10	15 －330	15

(Note) *: minimum value－maximum value

Chapter 3.

Summary of the Results of the Monitoring of Water and Bottom Sediments (Fiscal Year 1998)

Chapter 3. Summary of the Results of the Monitoring of Water and Bottom Sediments (Fiscal Year 1998)

1. Purpose of the survey

The purpose of this survey is to observe annually the pollution in the environment by chemical substances (especially Class 1 Specified Chemical Substances) which have been confirmed to persist in water and bottom sediments from results of environmental surveys etc., by way of grasping the long term environmental persistence of these substances, by using gas chromatography/ mass spectrometer (GC/MS) which has a characteristic of being able to analyze many different kinds of chemical substances simultaneously with high sensitivity.

2. Outline of the survey

(1) Surveyed substances

A total of 20 substances as shown in Table 3-1 and 3-2.

(2) Surveyed areas

A total of 18 areas (8 rivers, 7 seas, 3 lakes and marshes) as shown in Figure 3-1.

(3) Sampling method

In principle, one sample each of water and bottom sediments is collected in each surveyed area. For quality control sake, the sample homogenized uniformly prior to the analysis is divided into 2 parts, analytical samples A and B.
When the difference between two analytical values of A and B exceeds the allowable limits, the analysis shall be repeated. A reagent control shall be included in samples for the analysis.

(4) Analytical method

Prior to the analysis a test is to be conducted to confirm that the expected performance can be achieved with the GC/MS equipment, using the standard solution containing the surveyed substances. GC/MS equipment is also checked with DFTPP (Decafluorotriphenylphosphine) in accordance with the standard operating procedure.

The calibration curve for analysis shall be prepared using over the 5 point range. The relative response factor is obtained from the ratio of the equipment responses between analyte and internal standard or surrogate compound. The daily variation of the relative response factor shall not exceed ±20%, and the drift shall be within ±15%. Unknown sample for round robin test shall be analyzed to check the precision and accuracy.

3. Survey Results

The survey results up to fiscal year 1998 have been indicated in Table 3-1.

In water, a total of 5 substances out of 20 subsatances, namely o-dichlorobenzene, m-dichlorobenzene, p-dichlorobenzene, BHT and tributyl phosphate were detected. All 20 substances were detected in bottom sediments.

The results of each surveyed area in the fiscal year 1998 survey are as follows.
In water, none of the substances subject to the survey were detected in the 6 areas of Lake Jusan, the river in Kofu City, Lake, Kobe Port, offshore of Himeji (Harimanada), offshore of Mizushima and the mouth of Shimanto River. In the other 12 areas, only 1 to 3 substances were detected, so the detected situation has been low in general.

The detected situation in bottom sediments was generally higher compared to water, and in 14 areas excluding the river in Kofu City (no substance), offshore of Himeji (Harimanada) (4 substances), offshore of Mizushima (4 substances) and Gotanda Bridge of Gotanda River (2 substance), 5 to 20 substances were detected in each area. And at the mouth of Yamato River all of the 20 substances were detected. The area where more than 11 substances (more than half of the substances subject to the survey) were detected, except the mouth of Yamato River, were Kobe Port (15 substances), Osaka Port (14 substances), Dokai Bay (13 substances), Lake Suwa (13 substances) and the mouth of Sumida River (13 substances). The areas where the highest detected value for each surveyed substance was recorded were the mouth of Yamato River (9 substances), Dokai Bay (5 substances), Osaka Port (3 substances), the mouth of Sumida River (2 substances) and the mouth of Ishikari River (1 substance). This indicates that the pollution level is high in inner bays with closed nature.

Table 3-1 Summary of the Results of Monitoring of Water

Chemical substances	Water (μ g/L)																									
	'98		'97		'96		'95		'94		'93		'92		'91		'90		'89		'88		'87		'86	
	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.
HCB*	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	1	0.0005	1	0.0033	1	0.0054	0	−
Dieldrin*	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	1	0.011	0	−	0	−	0	−
p, p'-DDE	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	1	0.0007	0	−
p, p'-DDD	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−
p, p'-DDT*	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−
trans-Chlordane*	0	−	0	−	0	−	0	−	0	−	1	0.0004	0	−	0	−	0	−	0	−	0	−	1	0.0016	0	−
cis-Chlordane*	0	−	0	−	0	−	0	−	0	−	1	0.0003	0	−	0	−	0	−	0	−	0	−	1	0.0009	1	0.01
trans-Nonachlor*	0	−	0	−	0	−	0	−	0	−	1	0.0002	0	−	0	−	0	−	1	0.005	0	−	1	0.0008	0	−
cis-Nonachlor*	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	1	0.004	0	−	0	−	0	−
Oxychlordane*	−		−		−		−		−		−		−		−		−		−		−		0	−	0	−
α-HCH	0	−	0	−	0	−	0	−	0	−	1	0.0053	0	−	0	−	0	−	0	−	1	0.0019	1	0.0018	0	−
β-HCH	0	−	0	−	0	−	0	−	0	−	0	−	1	0.009	1	0.026	2	0.012	2	0.010	3	0.045	1	0.010	0	−
o-Dichlorobenzene	2	0.013	6	0.034	7	0.085	5	0.029	3	0.21	5	0.087	7	0.29	4	0.034	5	0.045	6	0.16	3	0.23	3	0.41	3	0.62
m-Dichlorobenzene	2	0.013	3	0.049	7	0.046	4	0.012	2	0.018	3	0.028	5	0.025	3	0.012	4	0.022	3	0.019	4	0.028	1	0.036	1	0.06
p-Dichlorobenzene	11	0.094	12	0.242	12	0.1752	8	0.44	9	0.28	13	1.0	13	0.42	12	0.18	8	1.2	6	2.5	8	1.8	8	0.51	5	0.46
BHT	4	0.092	3	0.073	3	0.19	2	0.059	3	0.030	4	0.15	3	0.42	2	0.043	1	0.0046	2	0.061	3	0.052	−		0	−
o-Terphenyl	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	1	0.0011	0	−	1	0.0008	1	0.007	0	−
m-Terphenyl	0	−	0	−	0	−	0	−	1	0.0074	1	0.0017	1	0.0028	0	−	1	0.005	0	−	0	−	1	0.0004	1	0.01
p-Terphenyl	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−	0	−
Tributyl phosphate	2	0.23	3	0.152	1	0.0625	4	0.072	4	0.45	−		4	0.033	3	0.22	3	0.13	2	0.18	5	0.56	−		−	
Benzo [a] pyrene	0	−	0	−	0	−	0	−	0	−	1	0.017	0	−	0	−	−		−		−		−		−	
Total samples	18		18		18		18		17		19		18 (Note)		18 (Note)		18 (Note)		17 (Note)		22		20		18	

(Note) As for fiscal year 1989, the total samples are 16, 16 and 15 for p-dichlorobenzene, BHT and tributyl phosphate, respectively.

As for fiscal year 1990, the total samples are 16 and 17 for cis-nonachlor and tributyl phosphate, respectively.

As for fiscal year 1991 and 1992, the total samples are 17 for tributyl phosphate in each year.

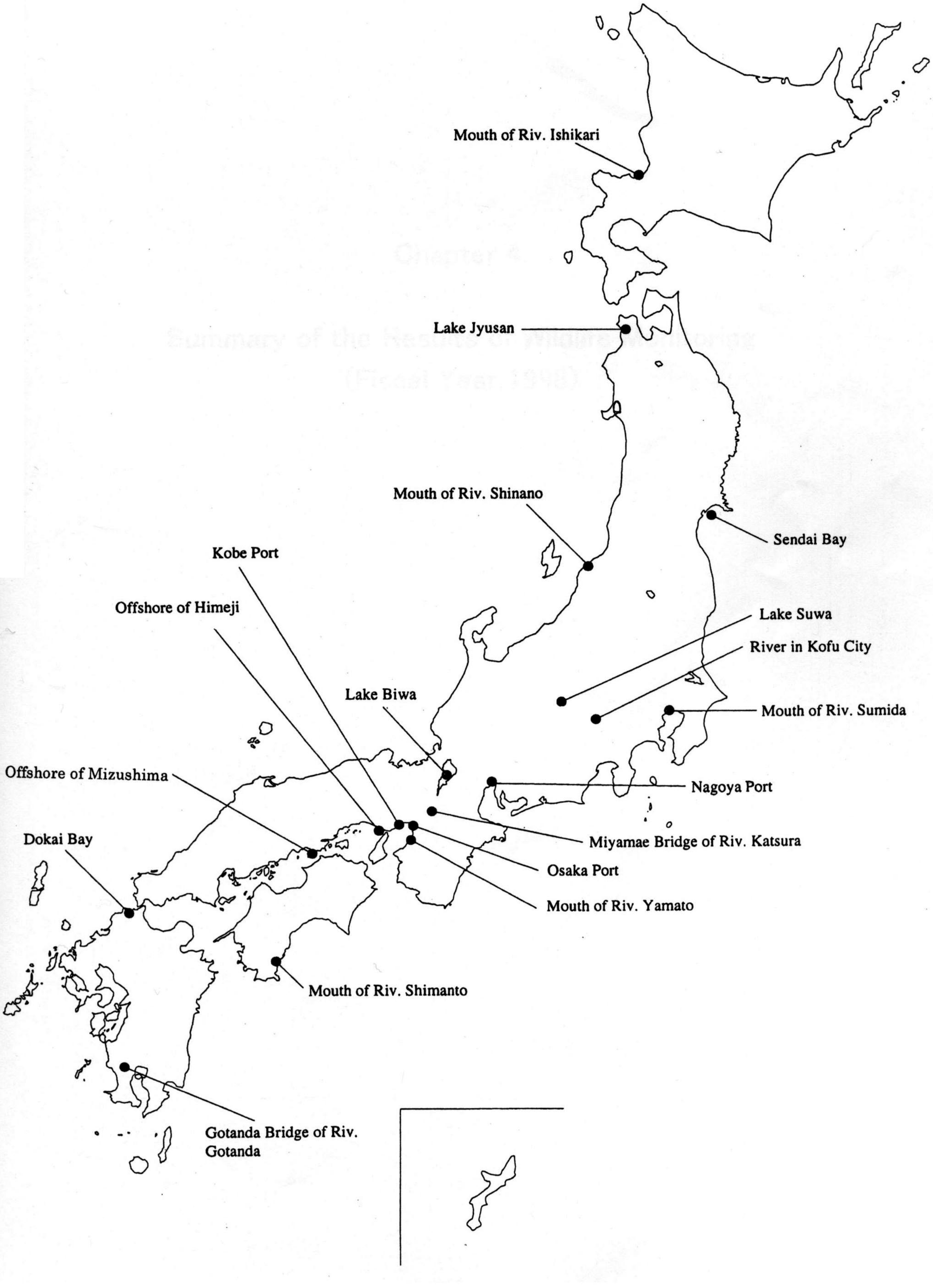
*denotes Class 1 Specified Chemical Substances.

Table 3-2 Summary of the Results of Monitoring of Bottom Sediments

Chemical substances	Bottom sediments (ng/g·dry)																									
	'98		'97		'96		'95		'93		'94		'92		'91		'90		'89		'88		'87		'86	
	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.	Detected samples	Max. conc.
HCB*	3	7.8	3	7.5	4	6.9	7	10	12	2	10	12	10	12	8	14	3	11	5	9.2	5	6.0	7	16	0	—
Dieldrin*	3	1.1	3	3.3	1	1.62	3	9.2	4	3	1	4.9	4	3.4	2	2.2	0	—	1	1.9	1	0.56	2	3.4	0	—
p, p'-DDE	13	41	12	8.3	14	34	8	28	14	52	12	29	11	60	12	74	8	51	10	37	11	12	8	13	0	—
p, p'-DDD	7	5.5	5	5.9	7	7.5	8	18	10	7.0	10	13	9	12	8	18	7	34	4	40	6	30	4	4.6	0	—
p, p'-DDT*	3	5.7	1	7.57	3	5.0	2	5.8	10	7.8	6	20	7	10	5	13	5	15	3	11	2	1.4	5	12	0	—
trans-Chlordane*	10	5.4	9	6.5	10	3.87	5	3.9	9	11	6	7.9	10	14	9	16	8	21	5	17	8	6.3	9	35	0	—
cis-Chlordane*	6	5.2	6	5.93	9	5	4	4.5	8	12	7	7.5	9	13	8	15	6	20	6	20	7	12	8	34	1	0.01
trans-Nonachlor*	7	4.4	8	6.12	6	3.28	4	4.1	8	8.9	5	6.7	8	12	7	14	5	12	4	13	7	5.5	9	30	0	—
cis-Nonachlor*	4	2	4	2.37	4	3	5	5.3	7	3.7	4	2.5	6	4.6	5	4.4	2	6.3	4	4.9	3	2.0	5	3.8	0	—
Oxychlordane*	—		—		—		—		—		—		—		—		—		—		—		0	—	0	—
α-HCH	1	0.38	1	0.42	2	5.0	2	1.7	3	2	3	2.0	2	0.72	1	2.0	1	2.5	0	—	1	0.21	1	0.04	0	—
β-HCH	1	2.1	3	3.14	5	8.43	3	3.4	4	2.3	2	16	1	0.90	2	4.4	4	7.3	2	15	2	16	2	0.16	0	—
o-Dichlorobenzene	14	45	14	42	15	39	13	60	17	81	15	46	14	48	14	56	7	46	12	20	10	13	9	57	3	0.62
m-Dichlorobenzene	9	10	11	16	13	34	9	21	15	18	10	14	12	16	9	17	4	13	4	14	3	2.3	6	7.5	1	0.06
p-Dichlorobenzene	17	73	17	99	16	209	15	120	18	150	16	75	16	130	16	150	10	73	13	88	15	32	12	55	5	0.46
BHT	11	97	9	29	11	73	13	63	15	90	11	70	13	120	9	120	9	34	5	75	6	150	—		0	—
o-Terphenyl	5	19	8	13	4	18	4	22	9	14	5	18	7	14	5	29	6	12	4	15	6	26	7	20	0	—
m-Terphenyl	14	180	13	130	15	110	11	140	16	120	13	140	16	200	15	160	12	110	10	100	10	53	13	190	1	0.01
p-Terphenyl	13	110	13	52	14	59	10	120	16	78	13	110	16	110	14	87	10	99	9	59	11	42	7	95	0	—
Tributyl phosphate	10	38	8	7.84	9	14.17	10	60	—		10	49	7	9.9	8	14	9	34	6	8.3	8	18	—		—	
Benzo [a] pyrene	15	2100	15	1500	16	1400	13	1700	17	1600	15	1600	17	2200	16	1500	—		—		—		—		—	
Total samples	18		18		18 (Note)		18 (Note)		19		17 (Note)		18 (Note)		18 (Note)		18 (Note)		17 (Note)		22		20		18	

(Note) As for fiscal year 1989, the total samples are 16, 16 and 15 for p-dichlorobenzene, BHT and tributyl phosphate, respectively.
As for fiscal year 1990, the total samples are 16 and 17 for cis-nonachlor and tributyl phosphate, respectively.
As for fiscal year 1991, the total samples are 17 for tributyl phosphate.
As for fiscal year 1992, the total samples are 15 for tributyl phosphate.
As for fiscal year 1993, tributyl phosphate is not surveyed in this survey, since it is subjected to environmental survey.
As for fiscal year 1994, the total samples are 16 and 15 for p, p'-DDT and BHT, respectively.
As for fiscal year 1995 and 1996, the total samples are 17 for p,p'-DDT in each year.
*denotes Class 1 Specified Chemical Substances.

Fig. 3-1 Locations for Monitoring of Water and Bottom Sediments (Fiscal Year 1998)



Chapter 4.

Summary of the Results of Wildlife Monitoring
(Fiscal Year 1998)

Chapter 4. Summary of the Results of Wildlife Monitoring (Fiscal Year 1998)

1. Purpose of the survey

The purpose of the survey is to grasp the environmental pollution by chemical substances on a yearly basis by way of conducting regular and systematic survey of the pollution level for wildlife by chemical substances (mainly Class 1 Specified Chemical Substances) which are thought to be harmful to human health and the environment.

2. Surveyed areas

Surveyed areas were selected where the pollution level in specific areas (around urban cities and industrial areas) and in periphery of the Japanese Archipelagos could be grasped comprehensively on long time basis.

The surveyed areas in the fiscal year 1998 survey, were 17 areas from the sea, 1 from fresh water, and 2 from land areas, in total 20 areas.

Figure 4-1 shows the surveyed areas and the name of the wildlife collected for survey.

3. Surveyed wildlife

The kinds of surveyed wildlife were selected for their significance and usefulness as a sample, together with the consideration for international comparison. A total of 12 kinds (mainly seabass and common mussel) were selected in the fiscal year 1998; 8 fishes, 2 shellfishes and 2 birds.

The characteristics of each kind of wildlife chosen for the survey are listed in Table 4-1.

5 samples were prepared from fishes, shellfishes and birds obtained from each surveyed area. In this case, when one body was not enough for the necessary quantity of a sample (for example, common mussel) more than one body were used for a sample.
Concerning each sample, the following parts of the body were taken and used as samples for analysis.

- fish: muscles
- shellfish: shucked shellfish

・ bird: pectoralis muscle

4. Surveyed chemical substances

The survey was conducted mainly concerning Class 1 Specified Chemical Substances. Taking into consideration past survey results, those chemical substances which had no difference in the detected level, or were almost not detected at all need not be surveyed every year. They have been the subject of the survey with appropriate intervals of time.

At present, 20 substances excluding organotin compounds as shown in Table 4-2 are subject to the monitoring survey.

Chlorinated organic compounds were analyzed using GC/ECD and organotin compounds were analyzed using GC/ECD or GC/FPD. However, when it could not be distinguished with other components, quantitative and qualitative analysis were conducted using GC/MS.

5. Survey results

Survey results in the fiscal year 1998 are as follows for each surveyed substance except for organotin compounds which are shown in Chapter 6. The figures in parentheses show the figures for FY1997 or those for 1996, if not surveyed in FY1997. (ppm indicates μg/g-wet)

(1) PCB and HCB

① PCB and HCB were designated as Class 1 Specified Chemical Substances based on the Chemical Substances Control Law in June, 1974, and August, 1979, respectively, since they are not readily biodegradable etc.. It is thus important from many aspects to follow their concentration levels in the environment. In this survey, PCB and HCB were selected as substances subject to the survey since fiscal year 1978, and monitoring has been conducted.

② PCB was detected in fishes, shellfishes and birds. The detection range for fishes and shellfishes were 0.01 to 0.29μg/g-wet (0.01 to 0.37μg/g-wet) and the detection frequency was 49 out of 100 samples (60 out of 100 samples) and the detection frequency in terms of area was 10 out of 20 areas. The detection range for birds was 0.01 to 0.02μg/g-wet (0.02μg/g-wet) and the detection frequency was 5 out of 10 samples (5 out of 10 samples) and the detection frequency in terms of area was 1 out of 2 areas.

HCB was detected in fishes and birds. The detection range for fishes was 0.001μg/g-wet (0.001μg/g-wet), and the detection frequency was 8 out of 70 samples (5 out of 70 samples), and the detection frequency in terms of area was 2 out of 14 areas. For birds, the detection range was 0.001 μ g/g-wet (0.001 to 0.002 μ g/g-wet) and the detection frequency was 3 out of 10 samples (5 out of 10 samples) and the detection frequency in terms of area was 1 out of 2 areas.

③ Use of PCB was generally discontinued in 1972 and designated as Specially Controlled Industrial Waste based on the Law Concerning Disposal and Cleaning of Industrial Waste in July 1992. But PCB is still detected in total 11 areas. The survey results in fiscal year 1998 indicate that PCB still persists in wide area of the environment.

As for PCB, from the viewpoint of global pollution monitoring, it remains necessary to continue monitoring of them and their chemical fate in the environment should be followed.

On the other hand, the level of detected concentration for HCB is low and the detection circumstance is generally leveling out or being improved. Although the substance is known to be formed unintentionally, if it is taken into consideration that the substantial production and use have already been ceased, the pollution circumstance is expected to be further improved. As for HCB, from the viewpoint of global pollution monitoring, it remains necessary to continue monitoring of them and their chemical fate in the environment should be followed.

(2) Drins (Dieldrin)

① Dieldrin is a kind of pesticides of the drins. The use of drins as agricultural chemicals is said to have been at its peak in 1955-1965, but its manufacture and use were substantially discontinued since 1971, but dieldrin had been used as an antitermite agent. However, in October, 1981, it was designated as a Class 1 Specified Chemical Substance based on the Chemical Substances Control Law, so that use of it was totally ceased together with the regulation as an agricultural chemical. In this survey, it was selected as the substance subject to the survey since the fiscal year 1978, and monitoring has been conducted.

② Dieldrin was detected in fishes, shellfishes and birds. The detection range for fishes and shellfishes was 0.001 to 0.055 μ g/g-wet (0.001 to 0.071 μ g/g-wet) and the detection frequencies were 14 out of 100 samples (19 out of 100 samples), and the detection frequency in terms of area was 4 out of 20 areas. For birds, the detection range was 0.001 μ g/g-wet (0.001 μ g/g-wet) and the detection frequency in terms of area was 1 out of 2 areas.

③ As for Dieldrin, both the detection frequency and the detection level are considered to be lowering in these days. But it remains necessary to continue monitoring of it, from the global monitoring point of view, and to grasp its tendency.

(3) DDTs and their derivatives

① DDT is a kind of pesticides which was popularly used together with HCH and Drins.

Use of it as an agricultural chemical has been discontinued since 1971. In October, 1981, it was designated as a Class 1 Specified Chemical Substance together with the Drins. DDT has several isomers based on the location of chlorine attached to the benzene ring. In this survey, p,p'-DDT which is an active component of DDT, o,p'-DDT, and the 4 kinds of derivatives, o,p'-DDD, p,p'-DDD, o,p'-DDE and p,p'-DDE which are the degradation products of DDT in the environment, were selected as substances subject to the survey since the fiscal year 1978, and monitoring has been conducted. In the survey of FY 1998, these 6 substances were the subject of the survey.

② p,p'-DDT was detected in fishes and birds. The detection range for fishes was 0.001 to 0.005 μ g/g-wet (0.001 to 0.047 μ g/g-wet) and the detection frequency was 35 out of 70 samples (26 out of 70 samples) and the detection frequency in terms of area was 9 out of 14 areas. The detection range for birds was 0.001 to 0.002 μ g/g-wet (not detected) and the detection frequency was 6 out of 10 samples (not detected for all of 10 samples) and detection frequency in terms of area was 2 out of 2 areas.

o,p'-DDT was detected only in fishes. The detection range was 0.001 μ g/g-wet (0.001 to 0.008 μ g/g-wet) and the detection frequency was 2 out of 70 samples (9 out of 70 samples) and the detection frequency in terms of area was 1 out of 14 areas.

p,p'-DDE was detected in fishes, shellfishes and birds. The detection range for fishes and shellfishes was 0.001 to 0.021 μ g/g-wet (0.001 to 0.033 μ g/g-wet) and the detection frequency was 79 out of 100 samples (65 out of 100 samples) and the detection frequency in terms of area was 17 out of 20 areas. As for birds, the detection range was 0.010 to 0.14 μ g/g-wet (0.009 to 0.149 μ g/g-wet) and the detection frequency was 10 out of 10 samples (10 out of 10 samples) and the detection frequency in terms of area was 2 out of 2 areas.

o,p'-DDE was detected only in fishes. The detection range was 0.001 to 0.002 μ g/g-wet (0.001 to 0.003 μ g/g-wet) and the detection frequency was 9 out of 70 samples (6 out of 70 samples) and the detection frequency in terms of area was 2 out of 14 areas.

p,p'-DDD was detected in fishes and shellfishes. The detection range was 0.001 to 0.009 μ g/g-wet (0.001 to 0.009 μ g/g-wet) and the detection frequency was 39 out of 100 samples (45 out of 100 samples) and the detection frequency in terms of area was 10 out of 20 areas.

o,p'-DDD was detected only in fishes. The detection range was 0.001 to 0.003 μ g/g-wet (0.001 to 0.004 μ g/g-wet) and the detection frequency was 6 out of 70 samples (10 out of 70 samples) and the detection frequency in terms of area was 2 out of 14 areas.

③ There has been no great difference in the detection range for each isomers and as before p,p'-DDE was detected in birds with high concentration levels in comparison with detected values for other DDTs. The detected frequencies for p,p'-DDT increased compared to that of the previous year. Since p,p'-DDTs persist widely in the environment although at low concentration levels, it remains necessary to continue monitoring of them hereafter, from the view point of global pollution monitoring.

(4) Chlordanes

① In the Detailed Environmental Survey conducted in fiscal year 1982, chlordanes were detected widely in the environment in bottom sediments and fishes, so that it was added to the substances subject to the survey since the fiscal year 1983. In Japan, it has been used for antitermite agents, lumber (primary processing), and plywood, but since it is not readily biodegradable, it was designated as a Class 1 Specified Chemical Substance based on the Chemical Substances Control Law in September, 1986. The compositions of chlordanes manufactured for industrial purposes are complicated, but in this survey, the 5 chlordanes were selected as substances subject to the survey which had high detection frequencies in the results of the fiscal year 1982 Detailed Environmental Survey for 8 chlordanes.

② Trans-nonachlor and oxychlordane were detected in fishes, shellfishes and birds. And the other 3 chlordanes were detected in fishes and shellfishes. For fishes the detection range of each chlordane was 0.001 to 0.010 μ g/g-wet (0.001 to 0.011 μ g/g-wet) and that of the whole chlordanes was 0.001 to 0.026 μ g/g-wet (0.001 to 0.025 μ g/g-wet). For shellfishes, the detection range of each chlordane was 0.001 to 0.016 μ g/g-wet (0.001 to 0.023 μ g/g-wet) and that of the whole chlordane was 0.002 to 0.022 μ g/g-wet (0.002 to 0.033 μ g/g-wet). For birds, the detection range of each chlordane was 0.001 to 0.002 μ g/g-wet (0.001 to 0.002 μ g/g-wet) and that of the whole chlordane was 0.002 μ g/g-wet (0.001 to 0.002 μ g/g-wet). The detection frequencies of these chlordanes for fishes and shellfishes were still high and it was 40 out of 70 samples (40 out of 70 samples) for fishes and the detection frequency in terms of area was 9 out of 14 areas. And for shellfishes the detection frequency was 20 out of 30 samples (20 out of 30 samples) and the detection frequency in terms of area was 4 out of 6 areas. And for birds, the detection frequency of trans-nonachlor was 6 out of 10 samples (5 out of 10 samples) and the detection frequency in terms of area was so high as 2 out of 2 areas.

③ Since chlordanes had been used until recently and the detection frequency is high, it remains necessary to continue to carefully follow their persistence in the environment hereafter, also from the viewpoint of global pollution monitoring.

(5) HCHs (α -HCH and β -HCH)

① HCHs had been used as agricultural chemicals in the past, but use of them has been discontinued since 1971. There are many isomers of HCHs, but in this survey, 4 isomers, α , β , γ , and δ , were selected as substances subject to the survey, and monitoring has been conducted since the fiscal year 1978. Monitoring was conducted for the 2 isomers, α and β in the fiscal year 1998.

② α -HCH was detected in fishes and shellfishes, and β -HCH was detected in fishes and birds. The detection range of α -HCH in fishes and shellfishes was 0.001 to 0.002 μ g/g-wet (0.001 μ g/g-wet) and the detection frequency was 11out of 100 samples (4 out of 100 samples) and the detection frequency in terms of area was 3 out of 20 areas.

The detection ranges of β-HCH in fishes and birds were 0.001 to 0.003 μg/g-wet (0.001 to 0.007 μg/g-wet) and 0.001 to 0.002 μg/g-wet (0.003 to 0.009 μg/g-wet), respectively. The detection frequencies were 10 out of 70 samples (12 out of 70 samples) and 10 out of 10 samples (10 out of 10 samples), respectively. The detection frequencies in terms of area were 2 out of 14 areas and 2 out of 2 areas.

③ HCH isomers except γ-isomer are said to have high persistence, and it is necessary to monitor and confirm their persistence in the environment by means of continued survey, from the point of view of global pollution monitoring.

Fig. 4-1 Surveyed Areas and Species for Wildlife Monitoring (Fiscal Year 1998)

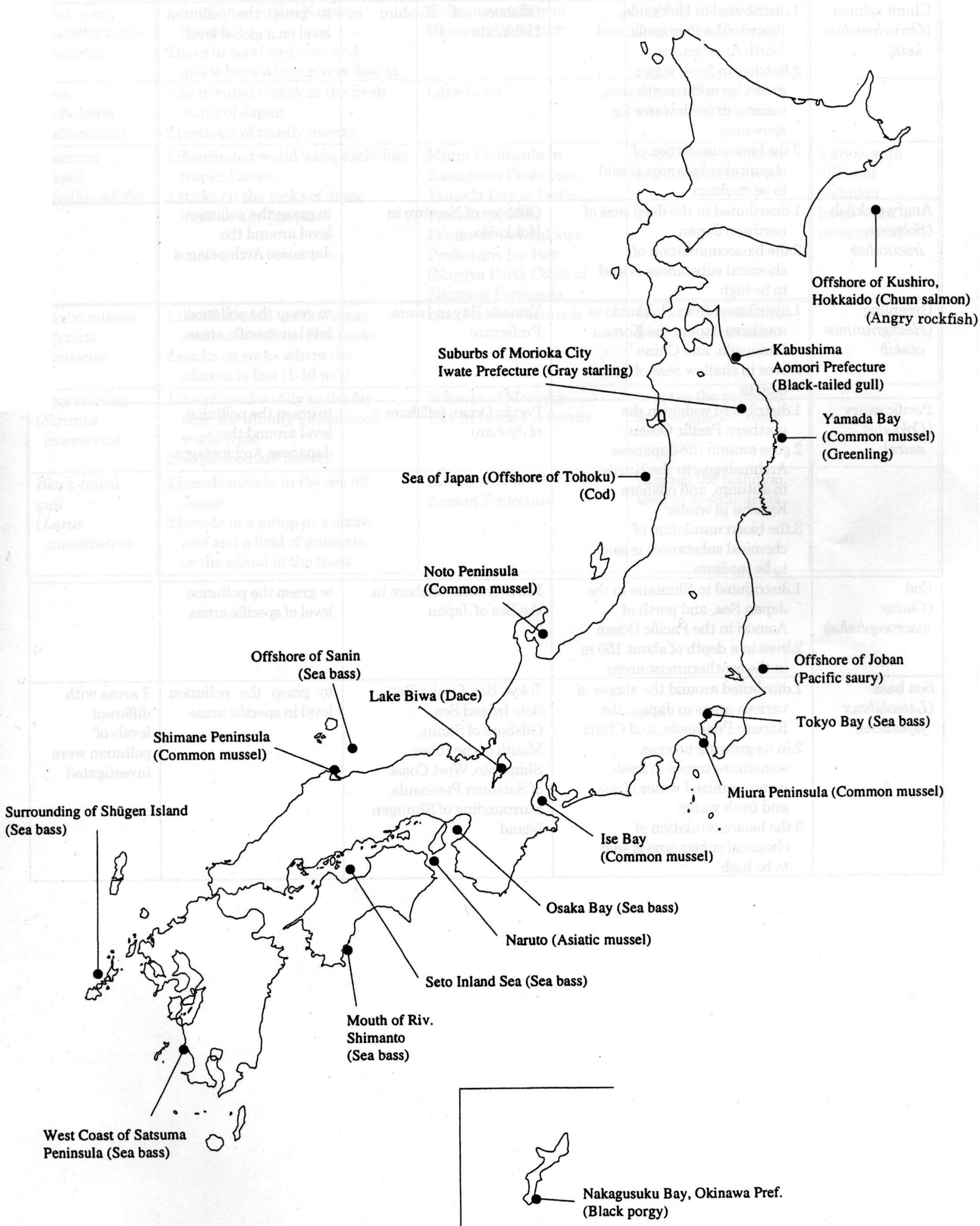


Table 4-1 Characteristics of Species Subject to Wildlife Monitoring

Species	Characteristics of species	Sampling areas	Object of investigation	Notes
Chum salmon (*Oncorhynchus keta*)	1.distributed in Hokkaido, Kamchatka Peninsula, and North America, etc. 2.hatches in fresh water, grows up in the north seas, returns to fresh water for spawning 3.the bioaccumulation of chemical substances is said to be medium	Offshore of Kushiro in Hokkaido	to grasp the pollution level on a global level	
Angry rockfish (*Sebastes iracundus*)	1.distributed in the deep seas of northern Japan 2.the bioaccumulation of chemical substances is said to be high	Offshore of Nemuro in Hokkaido.	to grasp the pollution level around the Japanese Archipelagos	
Greenling (*Hexagrammos otakii*)	1.distributed from Hokkaido to southern Japan, the Korean Peninsula, and China 2.lives in shallow seas of 5-50 m	Yamada Bay in Iwate Prefecture	to grasp the pollution level in specific areas	
Pacific saury(*Cololabis saira)*	1.distributed widely in the northern Pacific Ocean 2.goes around the Japanese Archipelagos; in the Kurils in autumn, and offshore Kyushu in winter 3.the bioaccumulation of chemical substances is said to be medium	Pacific Ocean (offshore of Jyoban)	to grasp the pollution level around the Japanese Archipelagos	
Cod (*Gadus macrocephalus*)	1.distributed in Shimane in the Japan Sea, and north of Aomori in the Pacific Ocean 2.lives in a depth of about 150 m in the southernmost areas	Northerneast offshore in the Sea of Japan	to grasp the pollution level of specific areas	
Sea bass(*Lateolabrax japonicus*)	1.ditributed around the shores of various areas in Japan, the Korean Peninsula, and China 2.in its growing process, sometimes comes to fresh water or mixed water of sea and fresh water. 3.the bioaccumulation of chemical substances is said to be high.	Tokyo Bay, Osaka Bay, Seto Inland Sea, Offshore of Sanin, Mouth of the River Shimanto, West Coast of Satsuma Peninsula, Surrounding of Shuugen Island	to grasp the pollution level in specific areas	7 areas with different levels of pollution were investigated

Table 4−1　Characteristics of Species Subject to Wildlife Monitoring (Continued)

Species	Characteristics of species	Sampling areas	Object of investigation	Notes
Black porgy(*Acanthopagrus sivicolus*)	1.distributed in the Nansei Islands 2.lives in coral reef seas and inside bays where rivers flow in	Nakagusuku Bay in Okinawa Prefecture	to grasp the pollution level in specific areas	
Dace(*Tribolodon hakonensis*)	1.distributed widely in the fresh water of Japan 2.predator of mostly insects	Lake Biwa	to grasp the pollution level in specific areas	
Common mussel(*Mytilus edulis*)	1.distributed world wide, excluding tropical zones 2.sticks on the rocks of inner bays and bridge piers	Miura Peninsula in Kanagawa Prefecture, Yamada Bay in Iwate Prefecture, Noto Peninsula in Ishikawa Prefecture, Ise Bay (Nagoya Port), Coast of Shimane Peninsula	to grasp the pollution level in specific areas	5 areas with different pollution levels were investigated
Asiatic mussel(*Mytilus coruscus*)	1.distributed in various areas south of southern Hokkaido 2.sticks on rocks where the current is fast (1-10 m/s)	near Naruto Channels	to grasp the pollution level in specific areas	
Gray starling(*Strunus cineraceus*)	1.distributed widely in the far east, the affinity ldistributed world wide 2.staple food are insects	Suburbs of Morioka City in Iwate Prefecture	to grasp the pollution level in specific areas	
Black-tailed gull□(*Larus crassirostris*)	1.breeds mainly in the sea off Japan 2.breeds in a group at a shore reef and a field of grass etc. or the island in the coast	Kabushima in Aomori Prefecture	to grasp the pollution level in specific areas	

Table4-2　Results of Wildlife Monitoring (Fiscal Year 1998)

(Unit : μ g/g-wet)

Substance		Fish		Shellfishes		Birds		Total	
		Detected freq.	Detection range	Detected freq.	Detection range	Detected freq.	Detection range	Detected freq.	Detection range
PCBs	PCB	39	0.01 ～0.29	10	0.02～0.09	5	0.01 ～0.02	54	0.01 ～0.29
	HCB *	8	0.001	0	－	3	0.001	11	0.001
Drins	Dieldrin *	6	0.001～0.002	8	0.001～0.055	5	0.001	19	0.001～0.055
DDTs	o,p'-DDT *	2	0.001	0	－	0	－	2	0.001
	p,p'-DDT	35	0.001～0.005	0	－	6	0.001～0.002	41	0.001～0.005
	o,p'-DDE *	9	0.001～0.002	0	－	0	－	9	0.001～0.002
	p,p'-DDE	59	0.001～0.021	20	0.001～0.003	10	0.010～0.14	89	0.001～0.14
	o,p'-DDD *	6	0.001～0.003	0	－	0	－	6	0.001～0.003
	p,p'-DDD	29	0.001～0.009	10	0.001～0.003	0	－	39	0.001～0.009
Chlordanes	trans-Chlordane	15	0.002～0.004	20	0.001～0.004	0	－	35	0.001～0.004
	cis-Chlordane	25	0.001～0.010	20	0.001～0.016	0	－	45	0.001～0.016
	trans-Nonachlor	40	0.001～0.008	10	0.002～0.003	6	0.001～0.002	56	0.001～0.008
	cis-Nonachlor	18	0.001～0.006	5	0.001	0	－	23	0.001～0.006
	Oxychlordane	5	0.001	5	0.002～0.003	1	0.001	11	0.001～0.003
	Total-Chlordanes	40	0.001～0.026	20	0.002～0.022	6	0.002	66	0.001～0.026
HCHs	α-HCH *	8	0.001～0.002	3	0.001	0	－	11	0.001～0.002
	β-HCH *	10	0.002～0.003	0	－	10	0.001～0.002	20	0.002～0.003
Organotin compounds	TBT	17	0.05～0.09	10	0.06～0.11	0	－	27	0.05～0.11
	TPT	14	0.02～0.05	0	－	0	－	14	0.02～0.05
Total samples		70		30		10		110	

(Note) * : The result of each material is compared with the result in fiscal year 1996.

Chapter 5.

Summary of the Results of the Investigation and Survey of Designated Chemical Substances etc.
(Fiscal Year 1998)

Chapter 5. Summary of the Results of the Investigation and Survey of Designated Chemical Substances etc. (Fiscal Year 1998)

1. Purpose of the survey

In accordance with the amended Chemical Substances Control Law enforced in 1987, designated chemical substances are subjected to toxicity tests based on the situation of its persistence in the environment. If toxicity is observed, it is designated as a Class 2 Specified Chemical Substance. For the substance it is required to submit prior notification of the scheduled production or importation volume, and the production or importation volume are restricted when necessary. In this circumstance, the Environment Agency has conducted the "Investigation and Survey of the Persistence in the Environment of Designated Chemical Substances etc." since the fiscal year 1988, and later the Agency has been increasing points for survey and improving precision of measurement, for the purpose of grasping the situation of persistence of Designated Chemical Substances and Class 2 Specified Chemical Substances in the general environment. Since the fiscal year 1990, the Study of the Exposure Route (investigation of the quantity of chemical substances humans are exposed to in daily life via multiple media) has been conducted, and the name of the survey was revised to the "Investigation and Survey of Designated Chemical Substances etc." The survey results in the fiscal year 1998 are as follows.

2. Summary of the survey

(1) Surveyed substances and media

The following substances and media were chosen in consideration of the production or importation volume and physicochemical properties of Designated Chemical Substances designated by the end of March, 1998.

	(substances)	(media)
①	Trichloroethylene (note 1)	indoor air, meals
②	Tetrachloroethylene (note 1)	indoor air, meals
③	Carbon tetrachloride (note 1)	air, indoor air, meals
④	Chloroform	air, indoor air, meals
⑤	1,2-Dichloroethane	air, indoor air, meals
⑥	1,2-Dichloropropane	air, indoor air, meals
⑦	1,4-Dioxane	water, bottom sediments
⑧	4,4'-Diaminodiphenylmethane	water, bottom sediments
⑨	Tributyltin Compounds (TBT) (note 2)	water, bottom sediments
⑩	Triphenyltin Compounds (TPT) (note 3)	water, bottom sediments

(note 1) Designated as a Class 2 Specified Chemical Substance from Designated Chemical Substances in April, 1989.

(note 2) TBTO was designated as a Class 1 Specified Chemical Substance from Designated Chemical Substances in January, 1990 and TBT compounds except for TBTO were designated as a Class 2 Specified Chemical Substances from Designated Chemical Substances in September, 1990.

(note 3) Designated as a Class 2 Specified Chemical Substances from Designated Chemical Substances in January, 1990.

(2) Surveyed points (See Figure 5-1)

In the Survey of the Persistence in the Environment, in order to grasp the situation of the persistence of Designated Chemical Substances etc. in the general environment, points for the survey were chosen so that they would not be directly affected by a specific source. The households for the study of the exposure route survey were chosen so that they would be as similar as possible to the air condition of the air survey. Survey points for surveyed media are as follows.

① Survey of the Persistence in the Environment (water and bottom sediments) : 36 points (20 points in sea, 4 points in lakes and marshes and 12 points in rivers)

② Survey of the Persistence in the Environment (air): 33 points

③ Study of the Exposure Route (indoor air and meals): 3 households each in 9 points

(3) Method of Analysis

① GC/MS-SIM : 1,2-dichloroethane, 1,2-dichloropropane (air, indoor air and meal) , trichloroethylene, tetrachloroethylene (indoor air), carbon tetrachloride, chloroform (air, indoor air), 1,4-dioxane, 4,4'-diaminodiphenylmethane, TBT, TPT(water, bottom sediments)

② GC/ECD : trichloroethylene, tetrachloroethylene, carbon tetrachloride, chloroform (meal)

3. Survey results

The results of the Survey of the Persistence in the Environment are indicated in Table5-1. The results of the Study of the Exposure Route are indicated in Table 5-2. Concerning survey results for TBT and TPT, refer to the fiscal year 1998 Summary of the Environmental Survey Results for Organotin Compounds.

Volume of exposure through the air and indoor air was calculated by multiplying each detected concentration by 15 m3/man/day (daily respiration volume of a man).

The results in the fiscal year 1998 are summarized below with some discussion. (The figures in parentheses are those for FY 1997 except otherwise noticed.)

(1) Trichloroethylene and Tetrachloroethylene

① Trichloroethylene is used for metal degreasing agents and solvents etc., and tetrachloro-ethylene is used for dry cleaning solvents and metal degreasing agents etc.. These 2 substances were designated as Designated Chemical Substances in May, 1987, and were later designated as Class 2 Specified Chemical Substances in April, 1989. As of October 1989, the 2 substances have been subject to waste water regulation and ground water regulation based on the Water Pollution Control Law, and in March, 1993, they were added to the items of the environmental quality standards for water pollution. Concerning air, the Guidelines on Environmental Atmosphere (provisional figure) was established in April, 1993, and the Environmental Quality Standard was established in February, 1997.

These 2 substances have been subject to the survey since the fiscal year 1988 for water, bottom sediments and air, and since the fiscal year 1989, water and bottom sediments were excluded due to their low detection frequencies and concentration levels in the fiscal year 1988 survey. Since the fiscal year 1997 air is excluded from the survey, because these substances were added to the items of Environmental Quality Standard and pollution circumstances by the substances are observed full time. Since the fiscal year 1990, the Study of the Exposure Route has also been conducted.

In the fiscal year 1998, the Study of the Exposure Route was conducted.

② (Survey results for trichloroethylene)

In the Study of the Exposure Route, the exposure range via indoor air was 3.6 to 100 μg/man/day (1.2 to 70μg/man/day), and the exposure range via meals was nd to tr (nd to 0.97μg/man/day). Although exposure levels varied from point to point, the exposures in most of the points were those derived from the indoor air. There was no great change in the situation of exposure.

(Survey results for tetrachloroethylene)

In the Study of the Exposure Route, the exposure range via indoor air was 2.1 to 96 μg/man/day (5.9 to 67μg/man/day), and the exposure range via meals was nd to 0.5μ g/man/day (nd to 0.69μg/man/day). Although exposure levels varied from point to point, the exposures in most of the points were those derived from the indoor air. There was no great change in the situation of exposure.

③ Since trichloroethylene and tetrachloroethylene persist widely in the environment, it is necessary to continue surveys in order to monitor the situation of environmental pollution. However, for the Study of the Exposure Route (meals) which has showed continued low level exposure, it is considered to be possible to grasp the tendency by the study conducted at a certain interval (3 to 5 years).

(2) Carbon tetrachloride

①Carbon tetrachloride is used for raw material etc. in the chemical industry. It was designated as a Designated Chemical Substance in July, 1987, and was later designated as a Class 2 Specified Chemical Substance in April, 1989. It was added to the items of the Environmental Quality Standard for water pollution in March, 1993. In Japan, manufacture of the substance was ceased at the end of the fiscal year 1995, based on the Montreal Protocol. Carbon tetrachloride has been subject to the survey since the fiscal year 1988 for water, bottom sediments and air, and since the fiscal year 1989, water and bottom sediments were excluded due to its low detected frequencies and concentration levels in the fiscal year 1988 survey, and only the air has been surveyed. Since fiscal year 1990, the Study of the Exposure Route has also been conducted.

In the fiscal year 1998, the survey for air as well as the Study of the Exposure Route was conducted.

②The detection range in air was 0.24 to 2.1 μg/m3 (0.012 to 2.4 μg/m3), the detection frequency was 130/130 (128/128), and the geometric mean was 0.68 μg/m3 (0.62 μg/m3). In terms of point, it was detected in 33 out of 33 points (34 out of 34 points). In the Study of the Exposure Route, the exposure range via general or indoor air was 6.3 to 26 μg/man/day (3.3 to 31 μg/man/day) and the exposure range via meals was nd to tr (nd to 0.58 μg/man/day). Although the exposure levels varied from point to point, the exposures in most of the points were those derived from the general or indoor air. There was no apparent difference in indoor and general air.

In comparison with the past survey results, there was no apparent difference in the situation of pollution and exposure.

③Since carbon tetrachloride persists widely with a comparatively high concentration level in the environment, it is necessary to continue surveys in order to monitor carefully the situation of environmental pollution. However, for the Study of the Exposure Route (meals) which has showed continued low level exposure, it is considered to be possible to grasp the tendency by the study conducted at a certain interval (3 to 5 years).

(3) Chloroform

①Chloroform is used for raw materials for synthetic resin and solvents etc.. It was designated as a Designated Chemical Substance in July, 1987. In March, 1993, it was designated as the items for monitoring water pollution.

Chloroform has been subject to the survey since the fiscal year 1988 for water, bottom sediments and air, and in the fiscal year 1989, water and bottom sediments were excluded due to its low detection frequencies and concentration levels in the fiscal year 1988 survey, and only air has been surveyed. Since the fiscal year 1991, the Study of the Exposure Route has also been conducted.

In the fiscal year 1998, the survey for air as well as the Study of the Exposure Route was conducted.

② The detection range via air was 0.046 to 11 μg/m3 (nd to 5 μg/m3), the detection frequency was 126/126 (122/134), and the geometric mean was 0.31 μg/m3 (0.54 μg/m3). In terms of point, it was detected in 33 out of 33 points (33 out of 34 points).

In the Study of the Exposure Route, the exposure range via general or indoor air was 1.9 to 110 μg/man/day (2.8 to 62 μg/man/day) and the exposure range via meals was 3.4 to 14 μg/man/day (3.6 to 23 μg /man/day). Although the exposure levels varied from point to point, the exposures in most of the points were those derived from the media, general air, indoor air and meals . There was no apparent difference in indoor and general air.

In comparison with the past survey results, there was no apparent difference in the situation of pollution and exposure.

③ Since chloroform persists widely with a comparatively high concentration level in the environment, it is necessary to continue surveys in the environment.

(4) 1,2-Dichloroethane

① 1,2-Dichloroethane is used as raw material for vinylchloride monomer.

1,2-Dichloroethane was designated as Designated Chemical Substances in July, 1987. In March, 1993, 1,2-dichloroethane was added to the items of the Environmental Quality Standard for water pollution.

1,2-dichloroetane has been subject to the survey for water, bottom sediments and air since the fiscal year 1989. Water and bottom sediments were excluded from the survey for 2 reasons: first, because it was added to the item of the Environmental Quality Standard for water pollution and the situation of water pollution was to be constantly monitored, and second, since it was detected with low frequencies and concentration levels in the fiscal year 1992 survey. Since fiscal year 1993, only air has been surveyed. For 1,2-dichloropropane, water and bottom sediments were excluded due to its low frequencies and concentration levels in the fiscal year 1990 survey. Only air has been surveyed since the fiscal year 1991. The substance has been subject to the Study of the Exposure Route since the fiscal year 1994 due to the tendency of high detection frequency in air.

In the fiscal year 1998, survey for air as well as the Study of the Exposure Route was conducted.

② Survey results for 1,2-dichloroethane

The detection range in air was 0.0048 to 1.2 μg/m3 (tr to 2.7 μg/m3), the detection frequency was 102/102 (96/97) and the geometric mean was 0.084 μg/m3 (0.075 μg/m3). In terms of point, it was detected in 32 out of 32 areas (31 out of 32 areas).

In the Study of the Exposure Route, the exposure range via general or indoor air was 0.38 to 8.8 μg/man/day (tr to 13 μg/man/day), and the exposure range via meals was nd to tr μg/man/day (nd to 1.8 μg/man/day). Although the exposure levels varied from point to point, the exposures in most of the points were those derived from general or indoor air . There was no apparent difference in indoor and general air.

In comparison with the past survey results, there was no apparent difference in the situation of pollution and exposure.

③ Since 1,2-dichloroethane persists widely with a comparatively high concentration level in the environment, it is necessary to continue surveys in the environment. However, for the Study of the Exposure Route (meals) which has showed continued low level exposure, it is considered to be possible to grasp the tendency by the study conducted at a certain interval (3 to 5 years).

(5) 1,2-Dichloropropance

① 1,2-Dichloropropane is used as solvent for fat and asphalt.

1,2-Dichloropropane was designated as Designated Chemical Substances in March, 1988. In March, 1993, 1,2-dichloropropane was added to the items of the Environmental Quality Standard for water pollution.

1,2-dichloropropane has been subject to the survey for water, bottom sediments and air since the fiscal year 1989. Water and bottom sediments were excluded from the survey, because it was detected with low frequencies and concentration levels in the fiscal year 1990 survey. Since the fiscal year 1991, only air has been surveyed. The substance has been subject to the Study of the Exposure Route since the fiscal year 1994 due to the tendency of high detection frequency in air.

In the fiscal year 1998, survey for air as well as the Study of the Exposure Route was conducted.

② Survey results for 1,2-dichloropropane

The detection range in air was tr to 0.72 μ g/m3 (nd to 1.9 μ g/m3), the detection frequency was 82/86 (93/97), and the geometric mean was 0.02 μ g/m3 (0.033 μ g/m3). In terms of point, it was detected in 29 out of 30 points (31 out of 32).

In the Study of the Exposure Route, the exposure range via general or indoor air was 0.13 to 7 μ g/man/day (0.052 to 6.8 μ g/man/day), and the exposure via meals was not detected consecutively since the fiscal year 1995.

Although the exposure levels varied from point to point, the exposures in most of the points were those derived from general or indoor air . There was no apparent difference in indoor and general air.

In comparison with the past survey results, there was no apparent difference in the situation of pollution and exposure.

③ Since 1,2-dichloroethane persists widely with a comparatively high concentration level in the environment, it is necessary to continue surveys in the environment. However, for the Study of the Exposure Route (meals) which has showed continued low level exposure, it is considered to be possible to grasp the tendency by the study conducted at a certain interval (3 to 5 years).

(6) 1,4-Dioxane

①1,4-dioxane is used for a variety of industrial solvents. It was designated as a Designated Chemical Substance in October, 1987. It has been subject to the survey since the fiscal year 1989, and water and bottom sediments has been surveyed.

In the fiscal year 1998, water and bottom sediments were surveyed.

② The detection range in water was nd to 5.3 ng/ml (nd to 42.8 ng/ml), the detection frequency was 63/103 (70/102) and the geometric mean was 0.18 ng/ml (0.28 ng/ml). In terms of point, it was detected in 24 out of 35 points (24 out of 34 points).

The detection range in bottom sediments was nd to 0.051 μg/g-dry (nd to 0.041μg/g-dry), the detection frequency was 5/108 (4/105) and the geometric mean was 0.0019μg/g-dry (0.0017μg/g-dry). In terms of point, it was detected in 2 out of 36 points (1 out of 35 points).

In comparison with past survey results for water and bottom sediments, there was no apparent difference in the situation of pollution.

③Since 1,4-dioxane persists widely in the environment, it is necessary to continue surveys in order to monitor the situation of pollution in the environment.

(7) 4,4'-Diaminodiphenylmethane

① 4,4'-Diaminodiphenylmethane is used as synthetic raw material for diphenylmethane diisocyanate (MDI), and as a hardening agent for epoxy resins and a copolymer of polyurethanes.

It was designated as a Designated Chemical Substance in March, 1989. The survey was conducted for the first time in water and bottom sediments in the fiscal year 1989, but it was detected in very small quantities in both media.

In fiscal year 1998, survey was conducted for water and bottom sediments.

② The substance was not detected in water. And the detection range for bottom sediments was nd to 2.1μg/g-dry (nd to 0.88μg/g-dry*), the detection frequency was 31/97 (14/69) and the geometric mean was 0.015μg/g-dry (0.012μg/g-dry*). In terms of points, it was detected in 15 out of 33 points (6 out of 23 points*).

③ 4,4'-diaminodiphenylmethane was not detected in water alike the previous survey result (FY 1995).

The detection frequency for bottom sediments was higher in this survey than in the previous one. This is due to the lowered unified detection limit in the survey of the fiscal year 1998.

The level of concentration detected does not suggest any problem at present. But since the detection frequency is rising, it is considered to be suitable to conduct a survey after a certain period of time, in consideration of the situation of production or importation volume etc..

(*：results of FY1995 survey)

Fig. 5-1 Locations of Investigation and Survey of Designated Chemical Substances etc. (Fiscal Year 1998)

Note: 1. A, B and C means sea, lakes and marshes and rivers, respectively
2. — and ▭ means survey area of air and exposure route, respectively

Table 5-1 The Results of the Investigation and Survey designated Chemical Substances in Fiscal Year 1998 (The Survey of the Persistence in the Environment)

(Water & Bottom sediments)

(concentration unit : water: μ g/l, bottom sediments: μ g/g-dry)

	Detection range	Geometric mean	Detected frequency	Detected spot
1,4-Dioxane	nd～5.3	0.18	63/103	24/35
	nd～0.051	0.0019	5/108	2/36
4,4'-Diaminodiphenylmethane	nd～tr(0.024)	0.098	0/108	0/36
	nd～2.1	0.015	31/97	15/33

(Note) 1. The each of upper and lower column means the survey results for water and bottom sediments, respectively.

2. The geometric mean is calculated on condition that the nd is the half of the detection limit.

(Air)

	Detection range	Geometric mean	Detected frequency	Detected spot
Carbon tetrachloride	0.24 ～2.1	0.68	130/130	33/33
Chloroform	0.046 ～11	0.31	126/126	33/33
1,2-Dichloroethane	0.0048～1.2	0.084	102/102	32/32
1,2-Dichloropropane	tr(0.00063)～0.72	0.02	82/86	29/30

Table 5-2 Survery Results of Exposure Route (No.1)

(Unit: μ g/man･day)

Sampleing Point	Fiscal year	Trichloroethylene			Tetrachloroethylene			Carbon tetrachloridde			Chloroform		
		General air	Indoor air	Meals	General air	Indoor air	Meals	General air	Indoor air	Meals	General air	Indoor air	Meals
In Sapporo City	'98	–	3.6	nd	–	16	nd	8	10	nd	12	18	8.6
	'97	–	8.1	nd	–	67	nd	11	20	nd	12	39	4.5
	'96	1.5	10	nd	13	40	nd	15	8.4	nd	8.7	14	4.6
	'95	1.4	2.3	nd	8.4	17	nd	9.2	5.4	nd	8.4	8.5	8.5
	'94	0.84	2.5	1.1	11	14	2.1	7.7	4.5	nd	8.1	10	17
	'93	2.3	3.6	tr	17	16	2.6	2.6	4.7	tr	7.3	5.2	9.6
	'92	2.4	2.5	tr	17	30	1.2	2.2	9.9	nd	1.6	1.9	11
	'91	2.9	3.0	0.94	51	25	1.9	5.8	6.7	tr	5.2	6.2	13
	'90	1.1	tr	nd	32	6.9	1.8	2.5	3.4	nd	–	–	–
In Sendai City	'98	–	3.6	tr	–	15	tr	10	11	nd	6.2	11	14
	'97	–	1.2	nd	–	14	0.39	4.2	3.3	nd	5.4	14	8.4
	'96	6.1	4.9	nd	8.9	3.6	nd	4.7	3.4	nd	13	5.5	12
	'95	6.1	8.2	nd	3.7	43	tr	1.4	3.4	nd	2.3	4.6	12
	'94	4.5	4.7	nd	7.4	15	0.47	5.8	4.3	nd	5.2	13	23
	'93	1.5	2.5	nd	27	19	0.75	2.2	6.9	nd	9.3	41	22
	'92	6.6	46	tr	165	12	0.79	10	9.5	nd	5.9	21	21
	'91	not surveyed	18	nd	109	31	3.4	5.6	8.9	tr	4.0	22	29
	'90	3.9	13	nd	79	19	tr	10	9.9	nd	–	–	–
In Tokyo-to	'98	–	100	nd	–	88	nd	8.4	6.3	nd	110	68	5.1
	'97	–	55	nd	–	25	0.69	8.4	7.8	nd	62	40	3.6
	'96	54	100	tr	19	63	nd	5.2	8.3	nd	160	270	tr
	'95	67	65	nd	44	85	0.80	9.0	9.3	nd	58	75	9.6
	'94	56	143	tr	37	76	0.97	12	14	nd	10	34	8.3
	'93	26	72	tr	16	72	1.2	3.4	8	nd	not surveyed	32	6.3
	'92	77	56	tr	73	86	0.86	13	12	nd	15	31	4.1
	'91	45	60	tr	94	110	0.65	12	12	nd	45	55	2.1
	'90	101	138	tr	124	126	0.83	16	16	nd	–	–	–
In Kanazawa City	'98	–	6.5	nd	–	13	nd	8.8	11	nd	5.3	13	3.4
	'97	–	70	nd	–	43	tr	8.2	8.2	0.58	2.8	11	4.3
	'96	not surveyed	nd	nd	not surveyed	2.4	tr	nd	nd	tr	nd	nd	tr
	'95	not surveyed	9.3	nd	1.4	19	tr	5.5	7.3	nd	2.3	10	4.1
	'94	3.7	121	nd	1.5	6.8	0.34	10	4.3	nd	4.9	6.4	2.9
	'93	4.4	9.3	nd	4.7	226	0.83	11	8	nd	5.3	12	4.7
	'92	3.3	6.8	nd	7.1	16	nd	12	15	tr	2.8	8.8	tr
	'91	18	28	nd	14	46	0.54	11	21	nd	4.9	15	3.9
	'90	–	–	–	–	–	–	–	–	–	–	–	–
In Nagano City	'98	–	15	nd	–	5.6	tr	12	13	nd	6.8	8.6	3.5
	'97	–	14	nd	–	12	0.45	9.7	8.9	nd	5.5	7.4	6.6
	'96	8.8	11	nd	6.5	5.5	nd	11	11	nd	4.0	6.3	14
	'95	5.4	5.1	nd	10	2.5	nd	10	60	nd	4.1	17	6.8
	'94	11	20	nd	16	5.7	nd	11	11	nd	5.8	8.3	3.1
	'93	21	34	nd	9.8	12	nd	11	13	nd	3.8	14	4.8
	'92	13	17	nd	9.3	10	tr	10	11	nd	3.6	4.7	tr
	'91	7.4	13	nd	13	8.2	1.1	11	11	nd	5.1	6.8	8.6
	'90	7.0	26	nd	14	32	1.9	11	13	nd	–	–	–
In Nagoya City	'98	–	48	tr	–	28	tr	8.8	7.9	nd	8.1	10	10
	'97	–	50	0.97	–	12	tr	8.9	7.6	nd	10	22	23
	'96	24	76	tr	11	34	tr	4.4	9.4	tr	11	18	18
	'95	36	51	nd	19	31	0.99	8.8	14	0.62	13	26	25
	'94	29	53	nd	25	33	nd	1.2	8.9	0.25	2.1	13	9.1
	'93	28	53	tr	20	20	0.50	9	13	tr	6.9	12	15
	'92	24	56	0.96	20	19	0.46	10	10	tr	6.4	20	14
	'91	56	96	nd	35	436	2.3	6.2	9.3	0.87	5.9	12	13
	'90	24	53	tr	20	107	2.4	10	12	nd	–	–	–
In Kobe City	'98	–	27	tr	–	96	0.5	14	26	tr	5.8	72	4.6
	'97	–	15	nd	–	53	nd	14	31	nd	7.7	22	6.9
	'96	4.3	9.4	nd	9.9	21	nd	0.19	tr	nd	14	14	5.5
	'95	2.8	2.2	nd	10	4.1	nd	15	8.5	nd	8.2	14	nd
	'94	2.7	4.4	nd	18	12	nd	14	9.1	nd	19	9.0	tr
	'93	13	12	nd	17	24	tr	9.9	10	1.7	13	17	0.45
	'92	9.9	49	nd	22	29	0.31	10	12	2.7	14	44	3.7
	'91	13	35	tr	21	34	0.58	7.7	9.7	tr	14	20	8.9
	'90	7.1	6.0	nd	18	11	0.53	8.7	3.7	nd	–	–	–
In Takamatsu City	'98	–	4.8	tr	–	4.8	nd	11	11	nd	6.9	13	5.1
	'97	–	13	nd	–	6.4	nd	8.7	9.5	nd	7.0	16	6.3
	'96	3.2	6.8	nd	4.5	7.3	nd	9.3	9.1	nd	3.0	18	5.3
	'95	3.3	7.3	nd	7.0	9.0	nd	10	11	nd	10	14	8.8
	'94	5.4	3.7	nd	8.4	7.9	nd	11	10	nd	10	7.1	3.7
	'93	2.6	3.3	tr	4.8	7.1	nd	11	13	nd	4.2	11	5.1
	'92	8.2	6.2	nd	16	10	nd	13	11	nd	4.1	17	5.8
	'91	5.6	6.7	nd	7.3	9.0	tr	9.7	8.2	nd	14	9.3	5.6
	'90	3.3	1.8	nd	14	8.3	tr	11	9.2	nd	–	–	–
In Kitakyushu City	'98	–	10	nd	–	2.1	nd	8.1	10	nd	1.9	25	11
	'97	–	49	nd	–	5.9	nd	16	19	nd	4.5	21	14
	'96	3.4	4.1	nd	9.3	2.0	tr	5.3	3.6	nd	2.8	4.8	5.6
	'95	2.5	27	nd	7.7	2.6	tr	3.5	5.7	nd	1.7	19	4.1
	'94	not surveyed	26	nd	3.2	5.1	nd	not surveyed	7.3	nd	nd	5.9	4.2
	'93	3.9	7.4	nd	16	94	0.48	12	31	tr	21	32	15
	'92	2.4	31	nd	6.4	9.3	nd	3.3	8.3	nd	0.16	2.8	11
	'91	19	4.6	nd	54	228	0.65	23	6.5	tr	14	13	2.7
	'90	12	7.8	nd	1.4	2.7	0.54	3.0	3.8	tr	–	–	–
Geometric mean	'98	– (–)	13 (25)	tr (tr)	– (–)	15 (30)	tr (tr)	9.7 (9.9)	11 (12)	tr (tr)	8.3 (19)	19 (27)	6.4 (7.3)
	'97	– (–)	18 (31)	tr (tr)	– (–)	18 (26)	tr (tr)	9.3 (9.9)	11 (13)	tr (tr)	8.1 (13)	19 (21)	7.2 (8.6)
	'96	6.8 (13)	10 (25)	tr (tr)	9.5 (10)	10 (20)	tr (tr)	2.8 (6.1)	3.9 (6.1)	tr (tr)	6.1 (25)	8.7 (39)	6.1 (7.7)
	'95	6.3 (16)	10 (20)	nd (nd)	8.3 (12)	13 (24)	tr (tr)	6.8 (8.1)	9.3 (14)	tr (tr)	6.4 (12)	15 (21)	3.8 (8.8)
	'94	6.6 (14)	16 (42)	tr (tr)	9.9 (14)	13 (20)	0.30 (0.51)	7.6 (9.1)	7.6 (8.2)	tr (tr)	5.1 (7.3)	10 (12)	5.1 (8.0)
	'93	6.8 (11)	11 (22)	tr (tr)	13 (15)	30 (55)	0.52 (0.79)	6.7 (8.0)	10 (12)	tr (tr)	7.6 (8.9)	16 (20)	6.3 (9.2)
	'92	8.5 (16)	19 (30)	tr (tr)	20 (37)	19 (25)	0.37 (0.48)	8.1 (9.3)	11 (11)	tr (tr)	3.5 (5.9)	11 (17)	6.2 (8.3)
	'91	14 (21)	17 (29)	tr (tr)	31 (44)	46 (103)	0.96 (1.3)	9.2 (10)	9.8 (10)	tr (tr)	8.9 (12)	14 (18)	7.2 (9.7)
	'90	8.2 (20)	10 (31)	tr (tr)	21 (38)	19 (39)	0.84 (1.1)	7.7 (9.0)	7.6 (8.9)	tr (tr)	–	–	–

Table 5-2 Survey Results of Exposure Rote (No.2)

(Unit: μ g/man・day)

Sampling point	Fiscal year	1,2-Dichloroethane General air	1,2-Dichloroethane Indoor air	1,2-Dichloroethane Meals	1,2-Dichloropropane General air	1,2-Dichloropropane Indoor air	1,2-Dichloropropane Meals
In Sapporo City	'98	0.60	0.42	nd	0.29	0.41	nd
	'97	0.63	0.50	nd	0.45	0.61	nd
	'96	0.43	0.20	nd	0.33	0.20	nd
	'95	0.52	0.20	nd	0.42	0.17	nd
	'94	4.50	0.16	nd	0.36	0.16	nd
In Sendai City	'98	8.8	1.7	nd	2.1	1.4	nd
	'97	nd	0.04	1.8	0.052	0.13	nd
	'96	0.79	0.94	nd	0.99	1.8	nd
	'95	0.71	0.53	nd	0.32	0.4	nd
	'94	1.4	0.76	nd	0.23	0.4	nd
In Tokyo-to	'98	2.1	1.6	nd	7.0	6.6	nd
	'97	2.8	2.2	nd	6.8	3.7	nd
	'96	tr	0.52	3.3	0.96	1.7	nd
	'95	not surveyed	not surveyed	nd	1.1	3.4	nd
	'94	1.8	5.3	nd	6.3	8.5	nd
In Kanazawa City	'98	1.7	1.7	nd	0.72	0.38	nd
	'97	2.0	1.5	nd	0.33	0.55	nd
	'96	0.80	1.6	nd	0.24	0.98	nd
	'95	1.7	2.0	nd	1.1	1.5	nd
	'94	1.3	1.3	nd	0.15	1.0	nd
In Nagano City	'98	1.8	2.2	nd	0.89	1.3	nd
	'97	0.4	0.35	nd	0.17	0.25	nd
	'96	0.31	0.39	nd	0.32	0.47	nd
	'95	0.27	0.23	nd	0.34	0.21	nd
	'94	0.51	0.58	nd	0.48	0.36	nd
In Nagoya City	'98	1.8	3.1	nd	0.3	1.4	nd
	'97	3.4	3.1	nd	1.7	2.5	nd
	'96	not surveyed	2.3	nd	0.74	1.6	nd
	'95	17	18	nd	nd	0.48	nd
	'94	not surveyed	not surveyed	nd	not surveyed	not surveyed	nd
In Kobe City	'98	2.7	3.8	tr	not surveyed	not surveyed	nd
	'97	1.7	9.4	nd	3.1	3.1	nd
	'96	4.7	1.7	nd	not surveyed	nd	nd
	'95	4.4	3.0	nd	not surveyed	not surveyed	nd
	'94	2.8	5.3	nd	0.075	not surveyed	nd
In Takamatsu City	'98	0.38	0.66	nd	0.13	0.24	nd
	'97	4.4	3.5	nd	0.14	0.1	nd
	'96	0.60	1.3	nd	0.30	0.42	nd
	'95	2.2	1.8	nd	0.28	0.21	nd
	'94	0.75	1.1	nd	0.42	0.34	nd
In Kitakyushu City	'98	2.1	1.5	nd	not surveyed	not surveyed	nd
	'97	13	7.6	tr	1.8	2.4	nd
	'96	0.48	1.1	nd	0.13	0.24	nd
	'95	0.88	0.49	tr	0.28	0.25	nd
	94	0.43	0.98	nd	0.42	1.9	nd
Geometric mean	'98	1.7	1.5	tr	0.73	0.94	nd
		(2.4)	(1.8)	(tr)	(1.63)	(1.7)	(nd)
	'97	2.2	1.4	tr	0.61	0.74	nd
		(3.2)	(3.1)	(tr)	(1.6)	(1.5)	(nd)
	'96	0.51	0.89	tr	0.40	0.53	nd
		(1.0)	(1.1)	(tr)	(0.50)	(0.84)	(nd)
	'95	1.5	1.1	tr	0.33	0.46	nd
		(3.5)	(3.2)	(tr)	(0.48)	(0.83)	(nd)
	'94	1.28	1.13	nd	0.39	0.75	nd
		(1.69)	(1.92)	(nd)	(1.06)	(1.8)	(nd)

Calculation conditions

①Measured values of each point are arithmetic means of individual data which were treated by conduct of the unified detection limi

②nd means that all data are below the detection limit, and tr means that the mean of detected concentrations are below the unifie detection limit.

③The value of the geometric mean are the geometric mean of the arithmetic means of each household. As reference the arithmeti values of all data are indicated in parentheses. In that case nd is calculated as half of the detection limit.

④15 m3/man・day was used for inhalation volumes per person a day. Exposures in general air and indoor air were calculated b multiplying each concentration and inhalation volume together.

Measurements of general air were performed in the neighborhood areas of measuring points of indoor air, but not identica

⑤Exposures in meals were actual measured values (including values via drinking water.)

Chapter 6.

Summary of the Survey Results for Organotin Compounds (Fiscal Year 1998)

Chapter 6. Summary of the Survey Results for Organotin Compounds (Fiscal Year 1998)

1. Purpose of the survey

As a result of the General Inspection Survey of Chemical Substances on Environmental Safety, environmental pollution all over Japan caused by organotin compounds became apparent, so environmental pollution has been monitored in wildlife (fishes and shellfishes and birds) in wildlife monitoring since the fiscal year 1985 for tributyltin compounds and the fiscal year 1989 for triphenyltin compounds. Taking the results of this survey in consideration, 13 tributyltin compounds and 7 triphenyltin compounds were designated as Designated Chemical Substances based on the Chemical Substances Control Law between April, 1988 and March, 1989. Accordingly, surveys for bottom sediments and water have been conducted since the fiscal year 1988, without interruption in the Study and Survey of Designated Chemical Substances etc.

In 1990, bis(tributyltin) oxide (TBTO), which is a tributyltin compound among organotin compounds, was designated as a Class 1 Specified Chemical Substance based on the Chemical Substances Control Law, and the former Designated Chemical Substances of 7 triphenyltin compounds and 13 tributyltin compounds excluding TBTO were designated as Class 2 Specified Chemical Substances based on the said Law.

2. Summary of the survey

(1) Outline of the fiscal year 1998 Wildlife Monitoring Results (Concerning Organotin Compounds)

① Particulars leading to the survey

Among organotin compounds, tributyltin compounds were detected with relatively high concentration in the fiscal year 1984 Detailed Environmental Survey in bottom sediments and fishes in wide areas, so it became subject to wildlife monitoring since the fiscal year 1985.

Triphenyltin compounds were also detected in wide areas in the fiscal year 1988 chemical substances environmental survey. Some of the detected concentration levels in bottom sediments were high in some points (inside ports). A high detected concentration level was observed in the mouths of rivers and inner bays in fishes, so wildlife monitoring was initiated for triphenyltin compounds since the fiscal year 1989.

② Survey results(Table 6-1～6-4)

Tributyltin compounds were detected in fishes and shellfishes and triphenyltin compounds were detected in fishes only.

(2) Outline of the fiscal year 1998 Study and Survey of Designated Chemical Substances etc. (concerning organotin compounds)

① Particulars leading to the survey

The Environmental Persistence Survey in the Study and Survey of Designated Chemical Substances etc. was initiated in the fiscal year 1988 for the purpose of grasping the situation of persistence in the general environment of Designated Chemical Substances and Class 2 Specified Chemical Substances based on the Chemical Substances Control Law. Tributyltin compounds and triphenyltin compounds have been subject to this survey since the fiscal year 1988 and 1989, respectively, for the media of water and bottom sediments.

② Survey Results (Table 6-5～6-8)

Tributyltin compounds and triphenyltin compounds were detected in water and bottom sediments.

3. Evaluation of survey results

(1) Tributyltin compounds

Tributyltin compounds persist widely in the environment and their pollution levels remain largely at the same level in bottom sediments. And in wildlife and water the pollution levels remain largely at the same level or tend to be improved.

Although the pollution level at present does not seem to be at a harmful level, it is necessary to continue to promote measures against environmental pollution and to monitor the situation of environmental pollution. Furthermore, since the substances are pointed out to be those suspected to have endocrine disrupting effects, it is also necessary to endeavor to collect the toxicological knowledge including other related information.

(2) Triphenyltin compounds

Triphenyltin compounds persist widely in the environment, but the persistence in water shows a tendency to be improved and that in wildlife and bottom sediments remains at the same level. If the present production situation* is considered, the pollution is expected to be improved further. But it is necessary to continue to promote measures against environmental pollution and to monitor the situation of environmental pollution. Furthermore, since the substances are pointed out to be those suspected to have endocrine disrupting effects, it is also necessary to endeavor to collect the toxicological knowledge including other related information.

*：The situation that there is almost no domestic production/usage intended for use in open systems.

Table 6-1 Results of Wildlife Monitoring (Tributyltin Compound) (Fiscal Year1998)

(Unit : μg/g・wet(ppm))

Species	Sampling spot	Samples No. 1	2	3	4	5	Max.	Min.	Mean	Median	Detected freq.
Chum salmon	Offshore of Kushiro, Hokkaido	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Angry rockfish	Offshore of Kushiro, Hokkaido	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Greenling	Yamada Bay	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Pacific saury	Offshore of Joban	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Cod	Sea of Japan (Offshore of Tohoku)	tr(0.005)	tr(0.003)	tr(0.004)	tr(0.003)	tr(0.007)	tr	tr	-	tr	0/5
Sea bass	Tokyo Bay	tr(0.05)	0.06	tr(0.05)	tr(0.02)	tr(0.04)	0.06	tr	-	tr	1/5
Sea bass	Osaka Bay	0.07	0.06	0.08	0.08	0.09	0.09	0.06	0.076	0.08	5/5
Sea bass	Seto Inland Sea	0.07	tr(0.03)	0.07	0.09	0.09	0.09	tr	-	0.07	4/5
Sea bass	Offshore of Sanin	0.08	0.05	tr(0.047)	tr(0.049)	0.08	0.08	tr	-	0.05	3/5
Sea bass	Mouth of Riv. Shimanto	tr(0.004)	tr(0.018)	tr(0.014)	tr(0.003)	tr(0.009)	tr	tr	-	tr	0/5
Sea bass	Surrounding of Shuugen Island	tr(0.030)	0.05	tr(0.020)	tr(0.020)	tr(0.005)	0.05	tr	-	tr	1/5
Sea bass	West Coast of Satsuma Peninsula	tr(0.03)	0.05	tr(0.04)	0.08	0.05	0.08	tr	-	0.05	3/5
Black porgy	Nakagusuku Bay, Okinawa Pref.	tr(0.02)	nd	nd	tr(0.01)	nd	tr	nd	-	nd	0/5
Dace	Lake Biwa	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Fishes							0.09	nd	-	tr	17/70
Common mussel	Yamada Bay	tr(0.02)	tr(0.03)	tr(0.02)	tr(0.02)	tr(0.03)	tr	tr	-	tr	0/5
Common mussel	Miura Peninsula	tr(0.037)	tr(0.035)	tr(0.033)	tr(0.044)	tr(0.043)	tr	tr	-	tr	0/5
Common mussel	Noto Peninsula	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Common mussel	Ise Bay	tr(0.003)	tr(0.003)	tr(0.003)	tr(0.003)	tr(0.004)	tr	tr	-	tr	0/5
Common mussel	Shimane Peninsula	0.08	0.08	0.10	0.11	0.11	0.11	0.08	0.096	0.10	5/5
Asiatic mussel	Naruto	0.06	0.10	0.09	0.07	0.07	0.10	0.06	0.078	0.07	5/5
Shellfishes							0.11	nd	-	tr	10/30
Gray starling	Suburbs of Morioka City	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Black-tailed gull	Kabushima, Aomori Pref.	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Birds							nd	nd	-	nd	0/10
Total(Total Samples 110)							0.11	-	-	tr	27/110

(Note) 1. The values are the equivalent values to TBTO.
2. Conduct of the unified detection limit is treated at 0.05μg/g・wet.
3. nd denotes no detection and tr denotes that the detected values are below the unified detection limit.

Table 6-2 Results of Wildlife Monitoring (Triphenyltin Compound) (Fiscal Year1998)

(Unit : μ g/g・wet(ppm))

Species	Sampling spot	Samples No. 1	2	3	4	5	Max.	Min.	Mean	Median	Detected freq.
Chum salmon	Offshore of Kushiro, Hokkaido	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Angry rockfish	Offshore of Kushiro, Hokkaido	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Greenling	Yamada Bay	nd	nd	nd	0.02	nd	0.02	nd	-	nd	1/5
Pacific saury	Offshore of Joban	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Cod	Sea of Japan (Offshore of Tohoku)	tr(0.006)	tr(0.005)	tr(0.013)	tr(0.009)	0.02	0.02	tr	-	tr	1/5
Sea bass	Tokyo Bay	0.03	tr(0.01)	tr(0.01)	tr(0.01)	tr(0.01)	0.03	tr	-	tr	1/5
Sea bass	Osaka Bay	0.03	0.02	0.05	0.02	0.03	0.05	0.02	0.030	0.03	5/5
Sea bass	Seto Inland Sea	0.04	0.02	0.04	0.04	0.04	0.04	0.02	0.036	0.04	5/5
Sea bass	Offshore of Sanin	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Sea bass	Mouth of Riv. Shimanto	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Sea bass	Surrounding of Shuugen Island	tr(0.005)	nd	nd	nd	nd	tr	nd	-	nd	0/5
Sea bass	West Coast of Satsuma Peninsula	nd	tr(0.01)	tr(0.01)	0.02	nd	0.02	nd	-	tr	1/5
Black porgy	Nakagusuku Bay, Okinawa Pref.	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Dace	Lake Biwa	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Fishes							0.05	nd	-	nd	14/70
Common mussel	Yamada Bay	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Common mussel	Miura Peninsula	tr(0.003)	tr(0.004)	tr(0.006)	tr(0.005)	tr(0.005)	tr	tr	-	tr	0/5
Common mussel	Noto Peninsula	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Common mussel	Ise Bay	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Common mussel	Shimane Peninsula	tr(0.006)	tr(0.008)	tr(0.008)	tr(0.010)	tr(0.009)	tr	tr	-	tr	0/5
Asiatic mussel	Naruto	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Shellfishes							tr	nd	-	nd	0/30
Gray starling	Suburbs of Morioka City	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Black-tailed gull	Kabushima, Aomori Pref.	nd	nd	nd	nd	nd	nd	nd	-	nd	0/5
Birds							nd	nd	-	nd	0/10
Total(Total Samples 110)							0.05	nd	-	nd	14/110

(Note) 1. The values are the equivalent values to TPTCl.
2. Conduct of the unified detection limit is treated at 0.02 μ g/g・wet.
3. nd denotes no detection and tr denotes that the detected values are below the unified detection limit.

Table 6-3 Results of Wildlife Monitoring of Tributyltin Compounds (Fiscal Year 1985－1998)

(D.S.=Detected samples) (Unit : μg/g・wet (ppm))

Species	Sampling spot	1985			1986			1987			1988			1989			1990			1991			1992			1993			1994			1995			1996			1997			1998		
		Max.	Min.	D.S.	Max.	Min.	D.S.	Max.	Min.	D.S.	Max.	Min.	D.S.	Max.	Min.	D.S.	Max.	Min.	D.S.	Max.	Min.	D.S.	Max.	Min.	D.S.	Max.	Min.	D.S.	Max.	Min.	D.S.	Max.	Min.	D.S.	Max.	Min.	D.S.	Max.	Min.	D.S.	Max.	Min.	D.S.
Chum salmon	Offshore of Kushiro, Hokkaido	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	tr	tr	0	tr	nd	0	nd	nd	0	nd	nd	0	tr	nd	0	nd	nd	0	nd	nd	0
Angry rockfish	Offshore of Nemuro, Hokkaido	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	tr	tr	0	nd	nd	0	nd	nd	0	nd	nd	0	tr	nd	0	nd	nd	0	nd	nd	0
Greenling	Yamada Bay	nd	nd	0	nd	nd	0	nd	nd	0	tr	nd	0	nd	nd	0	nd	nd	0	tr	tr	0	tr	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Pacific saury	Offshore of Joban	0.06	nd	1	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	0.06	nd	1	tr	tr	0	tr	nd	0	tr	nd	0	tr	nd	0	tr	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Cod	Offshore of Tohoku, Sea of Japan	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	tr	tr	0	tr	nd	0	tr	tr	0	tr	tr	0	tr	tr	0	tr	nd	0	tr	tr	0	tr	tr	0	tr	tr	0
Sea bass	Tokyo Bay	0.3	0.12	5	0.18	0.15	5	0.16	0.13	5	0.4	0.22	5	0.33	0.2	5	0.21	0.12	5	0.59	0.28	5	0.25	0.12	5	0.25	0.19	5	0.17	0.12	5	0.06	tr	2	0.12	0.07	5	0.099	0.072	5	0.06	tr	1
Sea bass	Osaka Bay	0.42	0.3	5	0.34	0.07	5	0.33	0.23	5	0.3	0.2	5	0.5	0.38	5	1.2	0.38	5	0.4	0.21	5	0.43	0.35	5	0.37	0.19	5	0.17	0.1	5	0.54	0.32	5	0.24	0.1	5	0.12	0.08	5	0.09	0.06	5
Sea bass	Seto Inland Sea	1.7	0.6	5	0.69	0.29	5	1.3	1.1	5	0.66	0.15	5	0.27	0.16	5	-	-	-	-	-	-	0.39	0.19	5	0.14	nd	3	0.13	0.1	5	0.3	tr	3	0.16	0.05	5	0.14	tr	2	0.09	tr	4
Sea bass	Offshore of Sanin	0.06	nd	2	0.11	0.05	5	0.09	tr	1	0.17	0.07	5	0.08	tr	3	tr	tr	0	tr	tr	0	tr	tr	0	0.06	tr	4	tr	nd	0	0.05	tr	1	0.05	tr	1	tr	tr	0	0.08	tr	3
Sea bass	Mouth of Riv. Shimanto	nd	nd	0	0.09	nd	2	nd	nd	0	0.05	tr	1	nd	nd	0	0.11	0.05	5	0.29	tr	3	tr	tr	0	0.16	tr	2	tr	tr	0	tr	tr	0	tr	tr	0	0.061	tr	1	tr	tr	0
Sea bass	Surrounding of Shuugen Island	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	0.23	0.07	5	0.49	0.07	5	0.18	tr	3	tr	tr	0	tr	tr	0	0.07	tr	1	0.07	tr	2	tr	tr	0	0.05	tr	1
Sea bass	West Coast of Satsuma Peninsula	0.37	0.2	5	0.21	0.05	5	0.07	tr	1	0.1	0.05	5	0.36	0.06	5	0.12	0.06	5	0.08	tr	3	0.07	tr	3	0.07	tr	4	tr	tr	0	0.13	nd	1	0.2	0.13	5	tr	tr	0	0.08	tr	3
Black porgy	Nakagusuku Bay, Okinawa Pref.	-	-	-	-	-	-	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	tr	nd	0	0.07	nd	1	nd	nd	0	tr	nd	0	tr	nd	0	tr	nd	0	nd	nd	0	tr	nd	0
Dace	Lake Biwa	nd	nd	0	nd	nd	0	nd	nd	0	0.05	nd	1	nd	nd	0	tr	tr	0	tr	tr	0	tr	tr	0	tr	tr	0	tr	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Fishes		1.7	nd	23	0.69	nd	27	1.3	nd	17	0.66	nd	27	0.5	nd	23	1.2	nd	26	0.59	nd	21	0.43	nd	22	0.37	nd	23	0.17	nd	15	0.54	nd	13	0.24	nd	23	0.14	nd	13	0.09	nd	17
Common mussel	Yamada Bay	0.12	0.1	5	0.24	0.13	5	0.43	0.3	5	0.27	0.22	5	0.34	0.32	5	0.51	0.42	5	0.38	0.11	5	0.45	0.35	5	0.78	0.6	5	0.1	0.07	5	0.15	0.12	5	0.07	0.05	5	0.06	tr	4	tr	tr	0
Common mussel	Miura Peninsula	0.28	0.05	5	0.06	0.05	5	0.06	0.05	5	0.07	nd	2	0.13	0.07	5	0.09	0.06	5	0.09	0.05	5	0.05	tr	1	tr	tr	0	tr	tr	0	0.06	tr	3	0.09	0.05	5	0.05	tr	4	tr	tr	0
Common mussel	Noto Peninsula	nd	nd	0	0.1	0.06	5	0.07	0.05	5	nd	nd	0	nd	nd	0	0.06	tr	4	tr	tr	0	0.05	tr	1	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Common mussel	Ise Bay	-	-	-	-	-	-	-	-	-	-	-	-	0.11	0.11	1	0.08	0.05	5	0.16	0.12	5	0.07	0.06	5	tr	tr	0	tr	tr	0	0.06	tr	2	tr	tr	0	tr	tr	0	tr	tr	0
Common mussel	Shimane Peninsula	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	tr	tr	0	tr	nd	0	0.07	0.05	5	0.05	tr	1	0.35	0.25	5	nd	nd	0	0.24	0.15	5	0.11	0.08	5
Asiatic mussel	Naruto	0.27	0.19	5	0.48	0.3	5	0.19	0.13	5	0.29	0.2	5	0.75	0.41	5	0.33	0.27	5	0.07	tr	3	0.1	0.07	5	0.07	0.05	5	tr	tr	0	0.08	0.07	5	0.07	0.05	5	0.09	0.08	5	0.10	0.06	5
Shellfishes		0.28	nd	15	0.48	0.5	20	0.43	0.05	20	0.29	nd	12	0.75	nd	16	0.51	tr	24	0.38	tr	18	0.45	nd	17	0.78	nd	15	0.1	nd	6	0.35	nd	20	0.09	nd	15	0.24	nd	18	0.11	nd	10
Gray starling	Suburbs of Morioka	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	tr	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Black-tailed gull	Tokyo Bay	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	tr	nd	0	nd	nd	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Black-tailed gull	Kabushima, Aomori Pref.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Birds		nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	tr	nd	0	tr	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Detected samples/Total samples		38/90			47/90			37/95			39/95			39/96			50/100			39/105			39/110			38/110			21/105			33/110			38/110			31/110			27/110		

(Note) 1. The values are the equivalent values to TBTO.The unified detection limit is 0.05 μg/g・wet (ppm)
2. Detected samples denote the numbers of detected samples in each sampling spot.
3. nd denotes no detection and tr denotes that the detected values are below the unified detection limit.
4. Black porgy in Nakagusuku Bay, Okinawa Pref., common mussel in Ise Bay, sea bass in surrounding of Shugen Island and common mussel in Shimane Peninsula have been monitored since fiscal year 1987, 1989, 1990 and 1991, respectively.
Monitoring of Black-tailed gull in Tokyo Bay was comleted in fiscal year 1993.
Monitoring of Black-tailed gull in Kabushima, Aomori Pref. was started in fiscal year 1995.
Sea bass in Seto Inland Sea could not be catched in fiscal year 1990 and 1991.
Monitoring of Angry rockfish in offshore of Nemuro, Hokkaudo was completed in fiscal year 1997
Monitoring of Angry rockfish in offshore of Nemuro, Hokkaudo was started in fiscal year 1997

Table 6-4 Results of Wildlife Monitoring of Triphenyltin Compounds (Fiscal Year 1989－1998)

(D.S.=Detected samples) (Unit : μ g/g・wet (ppm))

Species	Sampling spot	1989			1990			1991			1992			1993			1994			1995			1996			1997			1998		
		Max.	Min.	D.S	Max.	Min.	D.S	Max.	Min.	D.S	Max.	Min.	D.S	Max.	Min.	D.S	Max.	Min.	D.S	Max.	Min.	D.S	Max.	Min.	D.S	Max.	Min.	D.S	Max.	Min.	D.S
Chum salmon	Offshore of Kushiro, Hokkaido	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Angry rockfish	Offshore of Nemuro, Hokkaido	nd	nd	0	nd	nd	0	nd	nd	0	0.03	tr	3	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Greenling	Yamada Bay	0.46	0.26	5	0.89	0.64	5	0.3	0.09	5	0.24	0.11	5	0.13	0.05	5	0.1	0.05	5	0.07	0.06	5	0.03	nd	1	0.06	0.04	4	0.02	nd	1
Pacific saury	Offshore of Joban	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Cod	Offshore of Tohoku, Sea of Japan	0.06	0.03	5	0.03	tr	4	0.03	tr	2	0.03	tr	1	0.02	tr	1	tr	nd	0	tr	nd	0	tr	tr	0	tr	tr	0	0.02	tr	1
Sea bass	Tokyo Bay	2.3	1.3	5	0.45	0.16	5	0.48	0.26	5	0.13	0.11	5	0.1	0.06	5	0.1	0.06	5	nd	nd	0	nd	nd	0	0.03	tr	4	0.03	tr	1
Sea bass	Osaka Bay	1.4	1.2	5	1.9	0.99	5	0.59	0.23	5	0.23	0.2	5	0.34	tr	4	0.28	0.05	5	0.25	0.06	5	0.1	0.06	5	0.077	0.031	5	0.05	0.02	5
Sea bass	Seto Inland Sea	2.6	1.6	5	-	-	-	-	-	-	0.26	0.17	5	0.12	nd	3	0.13	0.08	5	0.19	0.04	5	0.27	0.05	5	0.12	0.03	5	0.04	0.02	5
Sea bass	Offshore of Sanin	0.11	0.05	5	0.08	0.05	5	0.04	0.02	5	0.13	0.07	5	0.05	0.02	5	0.1	nd	2	nd	nd	0	tr	nd	0	nd	nd	0	nd	nd	0
Sea bass	Mouth of Riv. Shimanto	nd	nd	0	0.16	0.02	5	nd	nd	0	tr	nd	0	0.03	nd	2	nd	nd	0	tr	tr	0	nd	nd	0	nd	nd	0	nd	nd	0
Sea bass	Surrounding of Shuugen Island	-	-	-	0.4	0.26	5	0.39	0.08	5	0.25	0.05	5	0.1	tr	4	0.06	0.03	5	0.18	0.04	5	0.06	0.04	5	0.029	tr	1	tr	nd	0
Sea bass	West Coast of Satsuma Peninsula	1.4	0.31	5	0.15	0.12	5	0.04	nd	2	nd	nd	0	0.06	nd	4	0.03	tr	1	0.03	nd	1	0.03	tr	4	nd	nd	0	0.02	nd	1
Black porgy	Nakagusuku Bay, Okinawa Pref.	nd	nd	0	0.03	nd	1	nd	nd	0	0.05	nd	1	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Dace	Lake Biwa	0.48	0.15	5	0.8	0.51	5	0.48	0.13	5	0.08	0.03	5	0.09	0.03	5	tr	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Fishes		2.6	nd	40	1.9	nd	45	0.59	nd	34	0.26	nd	40	0.34	nd	38	0.28	nd	28	0.25	nd	21	0.27	nd	20	0.12	nd	19	0.05	nd	14
Common mussel	Yamada Bay	0.3	0.19	5	0.13	0.1	5	0.09	0.07	5	0.11	0.08	5	0.07	0.04	5	0.04	0.03	5	nd	nd	0	nd	nd	0	nd	m	0	nd	nd	0
Common mussel	Miura Peninsula	0.45	0.29	5	0.11	0.09	5	0.07	0.05	5	0.05	0.04	5	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	tr	tr	0
Common mussel	Noto Peninsula	0.02	nd	1	nd	nd	0	tr	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Common mussel	Ise Bay	0.43	0.43	1	0.15	0.11	5	0.06	0.05	5	tr	tr	0	nd	nd	0	tr	tr	0	tr	tr	0	nd	nd	0	nd	nd	0	nd	nd	0
Common mussel	Shimane Peninsula	-	-	-	-	-	-	0.04	0.02	5	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	0.07	0.05	5	tr	tr	0
Asiatic mussel	Naruto	0.19	0.1	5	0.05	0.03	5	0.02	nd	2	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	5	nd	nd	0
Shellfishes		0.45	nd	17	0.15	nd	20	0.09	nd	22	0.11	nd	10	0.07	nd	5	0.04	nd	5	tr	nd	0	nd	nd	0	0.07	nd	5	tr	nd	0
Gray starling	Suburbs of Morioka City	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Black-tailed gull	Tokyo Bay	0.05	0.03	5	0.04	0.02	5	nd	nd	0	nd	nd	0	nd	nd	0	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-
Black-tailed gull	Kabushima, Aomori Pref.	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Birds		0.05	nd	5	0.04	nd	5	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0	nd	nd	0
Detected samples/Total samples		62/96			70/100			56/105			50/110			43/110			33/105			21/110			20/110			24/110			14/110		

(Note)1. The values are the equivalent values to TPTCl. The unified detection limit is 0.02 mg/g wet (ppm).
2. Detected samples denote the numbers of detected samples in each sampling spot.
3. nd denotes no detection and tr denotes that the detected values are below the unified detection limit.
4. Sea bass in surrounding of Shugen Island and common mussel in Shimane Peninsula have been monitored since fiscal year 1990 and 1991, respectively. Monitoring of Black-tailed gull in Tokyo Bay was completed in fiscal year 1993. Monitoring of Black-tailed gull in Kabushima, Aomori Pref. was started in fiscal year 1995. Sea bass in Seto Inland Sea could not be catched in fiscal year 1990 and 1991.
Monitoring of Angry rockfish in offshore of Nemuro, Hokkaudo was completed in fiscal year 1997
Monitoring of Angry rockfish in offshore of Nemuro, Hokkaudo was started in fiscal year 1997

Table 6-5 Results of the Survey of Tributyltin Compound in Water
(Based on the Study and Survey of Designated Chemical Substances,etc. in Fiscal Year 1990—1998)

(Unit: μ g/l (ppb))

Sampling spot	1990			1991			1992			1993			1994			1995			1996			1997			1998		
	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3
Mouth of Riv.Ishikari	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mouth of Riv.Tsutsumi																			nd	nd	nd	nd	nd	nd	-	-	-
Sendai Bay	0.018	0.011	0.004	0.006	nd	nd	nd	nd	nd	0.005	nd	nd	nd	0.007	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	-	-
Lake Hachiro	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Onahama Port	0.009	0.007	0.009	0.006	0.008	0.009	0.005	0.01	nd	0.003	nd	0.007	0.004	0.005	nd	nd	nd	nd	nd	0.005	nd	0.005	0.004	0.004	-	-	-
Kasumigaura	nd	nd	nd	nd	0.004	0.003	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	-	-
Coast of Ichihara and Anegasaki	0.045	0.051	0.042	0.017	0.011	0.016	0.003	0.003	0.003	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	tr(0.0013)	nd	tr(0.00037)
Mouth of Riv.Hanami																nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mouth of Riv.Sumida	0.012	0.012	0.014	0.016	0.028	0.015	0.004	0.004	0.004	0.005	0.006	0.005	0.008	0.007	0.005	0.005	0.005	0.006	0.005	0.004	0.004	0.006	0.008	0.006	0.0060	0.0066	0.0064
Mouth of Riv.Tamagawa	0.009	0.012	0.009	0.003	nd	0.015	nd	0.005	0.004	0.003	0.004	0.003	0.003	nd	0.003	0.003	0.003	nd	0.003	nd	nd	nd	nd	nd	0.0046	0.0038	0.0045
Yokohama Port	0.027	0.033	0.046	0.018	0.003	0.018	0.012	0.008	0.006	0.004	0.004	0.004	nd	0.005	0.003	0.004	0.003	nd	0.004	nd	0.003	0.004	nd	nd	0.0043	0.0063	0.0051
Mouth of Riv.Shinano	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mouth of Riv.Sai	nd	nd	0.03	0.015	nd	nd	0.005	nd	0.034	0.004	nd	0.005	nd	nd	nd	0.005	nd	0.01	nd	nd	nd	nd	0.009	nd	nd	nd	nd
Lake Suwa	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Shimizu Port	0.003	0.007	0.008	nd	nd	nd	nd	0.007	nd	nd	nd	nd	0.005	0.005	nd	nd	nd	nd	0.005	nd	nd	nd	nd	0.004	0.005	-	-
Nagoya Port	0.005	0.005	0.004	0.005	0.008	0.004	0.004	0.004	0.003	0.009	nd	nd	0.006	0.003	0.004	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	-	-
Yokkaichi Port	0.021	-	-	0.01	0.01	0.008	0.014	0.011	0.016	0.006	0.007	0.006	0.025	0.01	0.01	0.006	nd	0.008	0.003	0.004	nd	tr(0.002)	nd	nd	nd	nd	nd
South of Lake Biwa	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Miyazu Port	0.014	0.009	0.007	0.003	nd	nd	0.006	0.003	0.006	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Miyamae Bridge of Riv.Katsura	nd	nd	nd	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	-	-
Mouth of Riv.Yamato	-	-	-	0.005	0.005	0.007	0.022	0.024	0.007	nd	0.004	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Osaka Port	0.02	0.02	0.02	0.067	0.037	0.062	0.067	0.037	0.062	0.019	0.014	0.014	0.006	0.006	0.006	0.01	0.011	0.013	0.008	0.011	0.008	0.006	0.007	0.006	0.0032	0.0031	0.0031
Offshore of Himeji	0.014	0.013	0.013	nd	nd	nd	nd	nd	nd	-	-	-	nd	nd	nd	0.042	0.016	0.018	nd	0.005	0.009	nd	0.005	nd	nd	nd	nd
Offshore of Mizushima	0.011	0.008	0.015	0.013	0.008	0.008	0.005	0.011	0.009	0.027	0.013	0.013	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Kure Port	0.016	0.024	0.012	0.014	0.013	0.028																					
Hiroshima Bay							nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	-	-
Tokuyama Bay	0.005	0.004	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mouth of Riv.Yoshino				0.012	0.004	0.004	0.083	0.084	0.08	0.044	0.047	0.049	nd	nd	nd	nd	nd	nd	nd	0.003	nd	nd	nd	nd	-	-	-
Takamatsu Port	0.025	0.027	0.023	0.034	0.048	0.024	0.014	0.0014	0.005	0.011	0.011	0.007	0.009	0.004	0.004	0.004	0.004	0.006	0.012	0.014	0.003	nd	0.007	0.003	0.0038	0.0067	tr(0.0021)
Mouth of Riv.Shimanto	-	-	-	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Omuta	0.004	0.004	0.004	0.013	0.027	0.027	-	-	-	nd	nd	nd	0.03	nd	nd	0.04	0.01	0.01	0.004	0.003	0.004	nd	nd	nd	tr(0.00096)	tr(0.00063)	tr(0.00059)
Hakata Bay	0.01	0.009	0.012	0.006	0.008	0.007	0.026	0.028	0.012	0.02	0.025	0.017	0.006	0.005	0.006	nd	nd	nd	nd	nd	nd	nd	nd	nd	tr(0.0019)	tr(0.0018)	tr(0.0016)
Dokai Bay	0.048	0.029	0.049	0.015	0.02	0.012	0.007	0.011	0.014	0.006	0.006	0.01	0.006	0.022	0.007	0.017	0.013	0.018	0.006	0.005	0.01	0.0051	0.005	0.0051	tr(0.0025)	tr(0.0021)	0.0080
Imari Bay							0.032	0.019	0.008	0.007	0.008	0.007	0.01	0.013	0.01	0.007	0.005	0.005	-	-	-	0.004	0.004	-	tr(0.0025)	0.0033	tr(0.0021)
Nagasaki Port	0.04	0.02	0.04	0.014	0.011	0.008	0.003	0.003	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.003	nd	nd	nd	nd	nd	nd	0.0068	0.0060	0.0064
Mouth of Riv.Oyodo	0.016	0.005	0.004	0.013	0.011	0.015	0.004	nd	nd	nd	0.003	nd	0.003	nd	nd	0.013	nd	nd	0.006	0.003	nd	0.005	nd	nd	-	-	-
Gotanda Bridge of Riv. Gotanda	nd	nd	nd	0.003	0.003	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	-	-
Unified detction limit		0.003			0.003			0.003			0.003			0.003			0.003			0.003			0.003			0.003	
Detected frequency		62/79			60/93			52/99			42/99			35/99			31/105			27/105			21/107			20/76	
Maximum		0.051			0.067			0.084			0.049			0.03			0.042			0.014			0.009			0.0080	
Minimum		nd			nd			nd			nd			nd			nd			nd			nd			nd	
Geometric mean		0.0088			0.0057			0.0044			0.0032			0.0029			0.0025			0.0021			0.0019			0.001	

(Note) 1. The values are the equivalent values to TBTO.

2. nd denotes no detection, "-" denotes not measured and blunk column denotes not monitored.

3. The geometric mean is calculated on condition that nd is the half of the detection limit.

Table 6-6 Results of the Survey of Triphenyltin Compound in Water
(Based on the Study and Survey of Designated Chemical Substances, etc. in Fiscal Year 1990—1998)

(Unit: μ g/l (ppb))

Sampling spot	1990			1991			1992			1993			1994			1995			1996			1997			1998		
	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3
Mouth of Riv.Ishikari	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	-	-
Mouth of Riv.Tsutsumi																			tr(0.009)	nd	nd	nd	nd	nd	nd	nd	nd
Sendai Bay	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.011	0.005	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Lake Hachiro	nd	nd	nd	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Onahama Port	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Kasumigaura	-	-	-	nd	0.013	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Coast of Ichihara and Anegasaki	0.006	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mouth of Riv.Hanami																-	-	-	nd	nd	nd	nd	nd	nd	-	-	-
Mouth of Riv.Sumida	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mouth of Riv.Tamagawa	nd	nd	nd	nd	nd	0.014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Yokohama Port	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	tr(0.0006)	tr(0.0006)	tr(0.0007)
Mouth of Riv.Shinano	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mouth of Riv.Sai	nd	nd	nd	nd	nd	nd	nd	nd	0.007	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Lake Suwa	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Shimizu Port	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nagoya Port	0.005	0.006	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Yokkaichi Port	-	-	-	-	-	-	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
South of Lake Biwa	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Miyazu Port	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Miyamae Bridge of Riv.Katsura	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mouth of Riv.Yamato	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Osaka Port	-	-	-	nd	nd	nd	-	-	-	-	-	-	-	-	-	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Himeji	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	-	-	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Mizushima	0.012	0.014	0.014	nd	nd	nd	0.006	0.008	0.007	0.008	nd	nd	nd	nd	nd	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Kure Port	nd	nd	nd	nd	nd	nd																					
Hiroshima Bay							nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tokuyama Bay	0.005	0.005	0.005	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mouth of Riv.Yoshino				nd	nd	nd	0.04	0.044	0.016	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Takamatsu Port	nd	0.014	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	tr(0.00083)	0.0015	tr(0.00030)
Mouth of Riv.Shimanto	-	-	-	-	-	-	0.005	0.013	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Omuta	nd	nd	nd	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Hakata Bay	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	tr(0.00046)	tr(0.00055)	tr(0.00055)
Dokai Bay	0.047	0.041	0.048	0.0076	0.0088	nd	-	-	-	nd	nd	nd	0.006	0.007	-	-	-	-	nd	nd	nd	tr(0.0007)	tr(0.0006)	tr(0.0007)	0.0010	0.0012	tr(0.00090)
Imari Bay							nd	nd	nd	nd	nd	nd	nd	nd	nd	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nagasaki Port	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	tr(0.00060)	tr(0.00060)	0.0010
Mouth of Riv.Oyodo	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Gotanda Bridge of Riv. Gotanda	nd	0.01	0.02	nd	nd	nd	nd	0.006	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Unified detction limit	0.005			0.005			0.005			0.005			0.005			0.005			0.01			0.01			0.001		
Detected frequency	16/75			4/87			10/90			2/90			4/92			0/87			0/108			0/108			4/102		
Maximum	0.048			0.014			0.044			0.011			0.01			nd			tr			tr			0.0015		
Minimum	nd			nd			nd			nd			nd			nd			nd			nd			nd		
Geometric mean	0.0034			0.0027			0.0030			0.0026			0.0026			0.0025			0.0027			0.0026			0.00031		

(Note) 1. The values are the equivalent values to TPTCl.
2. nd denotes no detection, "-" denotes not measured and blunk column denotes not monitored.
3. The geometric mean is calculated on condition that nd is the half of the detection limit.

Table 6-7 Results of the Survey of Tributyltin Compound in Bottom Sediments
(Based on the Study and Survey of Designated Chemical Substances, etc. in Fiscal Year 1990－1998)

(Unit : μ g/g・dry (ppb))

Sampling spot	1990			1991			1992			1993			1994			1995			1996			1997			1998		
	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3
Mouth of Riv.Ishikari	0.0011	0.0009	0.0014	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.0013	nd	nd	nd	nd
Mouth of Riv.Tsutsumi																			0.0015	0.0045	0.0027	0.0087	0.011	0.011	0.0067	0.0055	0.0055
Sendai Bay	0.034	0.048	0.022	0.0068	0.0060	0.0069	0.0067	0.017	0.021	0.014	0.016	0.016	0.021	0.022	0.025	0.025	0.029	0.025	0.017	0.026	0.021	0.020	0.025	0.013	0.018	0.019	0.019
Lake Hachiro	nd	nd	nd	0.0014	0.0010	nd	0.0032	nd	nd	nd	nd	nd	nd	nd	0.001	nd	tr(0.0003)	nd	nd	nd	nd	nd	nd	nd	-	-	-
Onahama Port	0.029	0.042	0.18	0.094	0.051	0.067	0.017	0.034	0.0022	0.019	0.076	0.035	0.034	0.020	0.027	0.023	0.018	0.021	0.006	0.010	0.005	0.059	0.047	0.031	0.020	0.0055	0.0083
Kasumigaura	-	-	-	0.0030	0.0034	0.0034	0.0020	0.0030	0.0024	0.0022	0.0024	0.0030	0.0024	0.0021	0.0021	0.0035	0.0033	0.0034	0.0052	0.0036	0.0031	0.0032	0.0036	0.0027	0.0058	0.0045	0.0046
Coast of Ichihara and Anegasak	0.10	0.081	0.059	0.082	0.045	0.010	0.26	0.044	0.42	0.018	0.008	0.050	0.017	0.016	0.021	0.005	0.028	0.082	0.030	0.018	0.064	0.005	0.036	0.093	0.12	0.042	0.15
Mouth of Riv.Hanami																0.0078	0.0058	0.0065	0.016	0.020	0.0023				0.0036	0.004	0.0051
Mouth of Riv.Sumida	0.25	0.16	0.46	0.16	0.13	0.08	0.13	0.15	0.10	0.18	0.13	0.10	0.26	0.18	0.15	0.21	0.17	0.15	0.25	0.17	0.26	0.24	0.21	0.23	0.18	0.16	0.18
Mouth of Riv.Tamagawa	0.14	0.14	0.16	0.16	0.14	0.14	0.14	0.11	0.13	0.12	0.13	0.12	0.038	0.043	0.10	0.074	0.060	0.057	0.11	0.11	0.12	0.095	0.099	0.097	0.10	0.11	0.11
Yokohama Port	0.25	0.38	0.31	0.28	0.30	0.29	0.039	0.046	0.056	0.10	0.18	0.048	0.074	0.12	0.081	0.14	0.15	0.088	0.051	0.091	0.073	0.096	0.10	0.074	0.22	0.18	0.13
Mouth of Riv.Shinano	0.040	0.0031	0.0074	0.0093	0.0031	0.0041	0.030	0.033	0.020	0.023	0.015	0.047	0.019	0.020	0.0085	0.0046	0.0072	nd	0.0071	0.013	0.015	0.013	0.011	0.013	0.17	0.24	0.13
Mouth of Riv.Sai	0.035	0.0022	0.099	0.027	0.0032	0.044	0.055	0.011	0.0036	nd	0.0032	0.080	0.030	0.016	0.11	0.029	0.0026	0.260	0.016	0.029	0.048	0.0044	0.011	0.010	0.0069	0.0085	nd
Lake Suwa	-	-	-	nd	nd	nd	0.0016	0.0018	0.0018	0.0026	0.0026	0.0028	0.0037	0.0041	0.0038	0.0061	0.0066	0.0069	0.0051	0.0069	0.0068	0.0045	0.0057	0.0045	0.005	0.005	0.006
Shimizu Port	0.0055	0.0070	0.035	0.031	0.039	0.032	0.017	0.021	0.024	0.012	0.012	0.010	0.022	0.022	0.025	0.012	0.019	0.020	0.0089	0.0083	0.0067	0.011	0.014	0.012	0.020	0.005	0.011
Nagoya Port	0.097	0.015	0.065	0.098	0.0059	0.16	0.063	0.065	0.011	0.032	0.033	0.025	0.064	0.069	0.077	0.10	0.094	0.026	0.93	0.23	0.21	0.17	0.15	0.13	0.73	0.39	0.065
Yokkaichi Port	0.14	0.14	0.049	0.16	0.066	0.076	0.042	0.11	0.12	0.038	0.052	0.033	0.077	0.24	0.070	0.030	0.053	0.015	0.019	0.045	0.0064	0.0022	0.049	0.017	0.025	0.044	0.017
South of Lake Biwa	0.0033	0.034	0.0048	0.0024	-	0.011	0.013	0.029	0.026	0.0022	0.0082	0.0046	0.0047	0.0052	0.0075	0.0047	0.0052	0.0075	0.011	0.0086	0.014	0.0075	0.0089	0.0090	0.0086	0.015	0.020
Miyazu Port	0.0011	tr(0.0007)	0.0011	0.0034	0.0050	0.0041	0.0014	0.0025	0.0014	0.0056	0.024	0.0075	0.0011	0.0055	0.004	0.0009	0.0015	0.0018	0.0015	0.0010	0.0007	nd	nd	nd	0.0082	0.0028	0.0092
Miyamae Bridge of Riv.Katsura	tr(0.0006)	tr(0.0005)	nd	tr(0.0006)	0.0012	0.0008	nd	nd	nd	nd	nd	0.0015	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.0008	nd	nd
Mouth of Riv.Yamato	0.009	0.026	0.024	0.039	0.034	0.024	0.017	0.031	0.042	0.014	0.040	0.028	0.012	0.022	0.013	0.002	0.002	-	0.025	0.015	0.046	0.009	0.012	0.021	nd	nd	nd
Osaka Port	0.88	0.89	0.29	0.27	0.38	0.32	0.12	0.14	0.28	0.29	0.26	0.15	0.20	0.44	0.12	0.50	0.57	0.34	0.22	0.27	0.21	0.18	0.18	0.21	0.12	0.066	0.036
Offshore of Himeji	0.060	0.035	0.056	0.025	0.013	0.012	0.009	0.035	0.050	0.027	0.014	0.021	0.057	0.039	0.033	0.014	0.004	0.013	0.002	0.001	0.005	0.004	0.004	0.003	nd	nd	nd
Offshore of Mizushima	0.042	0.072	0.11	0.027	0.035	0.013	0.0041	0.0072	0.0087	0.017	0.013	0.013	0.0069	0.0058	0.0058	0.013	0.012	0.012	0.014	0.012	0.013	0.016	0.015	0.013	0.013	0.017	0.013
Kure Port	0.24	0.80	0.24	0.28	0.42	0.30																					
Hiroshima Bay							0.066	0.038	0.033	0.058	0.040	0.050	0.074	0.062	0.062	0.068	0.080	0.090	0.038	0.031	0.041	0.025	0.029	0.022	0.035	0.069	0.050
Tokuyama Bay	0.0021	0.0035	0.0029	0.0040	0.0031	0.0030	0.011	0.015	0.0085	0.0082	0.010	0.0085	0.013	0.0076	0.0089	0.0099	0.0081	0.012	0.01	0.0054	0.015	0.031	0.026	0.026	0.016	0.016	0.020
Mouth of Riv.Yoshino				0.0044	0.0058	0.0089	0.0083	0.010	0.0099	0.0008	nd	nd	0.0054	tr(0.0006)	0.0020	0.0011	nd	nd	0.0009	0.0010	0.0029	0.0045	nd	nd	tr(0.0007)	0.0008	0.0039
Takamatsu Port	0.36	0.054	0.038	0.180	0.120	0.071	0.11	0.031	0.029	0.10	0.033	0.022	0.11	0.038	0.042	0.34	0.077	0.072	0.029	0.012	0.018	0.066	0.020	0.034	0.10	0.051	0.054
Mouth of Riv.Shimanto	0.013	nd	nd	-	-	-	0.0021	nd	0.0006	0.0023	0.0006	0.0007	0.0019	tr(0.0003)	0.012	0.012	tr(0.0003)	0.0019	0.0007	0.0066	0.0064	0.0008	0.0008	tr(0.0001)	0.0028	0.0021	0.0017
Offshore of Omuta	0.040	0.038	0.009	0.061	0.040	0.037	0.020	0.012	0.014	0.008	0.008	0.011	0.022	0.008	0.012	0.53	0.09	0.11	0.016	0.016	0.012	0.018	0.045	0.0081	0.010	0.0074	0.0069
Hakata Bay	0.018	0.018	0.016	0.027	0.021	0.016	0.029	0.015	0.016	0.010	0.0087	0.012	0.0082	0.010	0.013	0.010	0.0084	0.014	0.0063	0.0064	0.0070	0.0018	0.0015	0.0013	0.014	0.046	0.021
Dokai Bay	0.17	0.085	0.25	0.22	0.14	0.33	0.20	0.25	0.28	0.35	0.38	1.6	0.20	0.31	0.16	0.24	0.12	0.037	0.17	0.19	0.055	0.082	0.056	0.072	0.051	0.17	0.092
Imari Bay							0.19	0.22	0.09	0.12	0.12	0.088	0.16	0.097	0.12	0.073	0.078	0.095	0.127	0.157	0.238	0.098	0.099	0.079	0.041	0.10	0.10
Nagasaki Port	0.13	0.12	0.11	0.053	0.064	0.062	0.041	0.032	0.046	0.025	0.027	0.021	0.031	0.035	0.016	0.059	0.035	0.083	0.057	0.023	0.034	0.025	0.021	0.028	0.092	0.093	0.090
Mouth of Riv.Oyodo	0.0013	0.0009	0.0015	0.0027	0.0015	0.0077	nd	nd	0.0046	nd	nd	nd	tr(0.0007)	0.0012	tr(0.0007)	0.0021	nd	0.0016	0.0007	nd	nd	nd	nd	nd	nd	nd	nd
Gotanda Bridge of Riv. Gotanda	nd	0.0016	nd	0.0012	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Unified detction limit		0.0008			0.0008			0.0008			0.0008			0.0008			0.0008			0.0006			0.0008			0.0008	
Detected frequency		79/90			85/95			88/102			85/102			87/102			87/104			94/108			85/105			86/105	
Maximum		0.89			0.42			0.42			1.6			0.44			0.57			0.93			0.24			0.73	
Minimum		nd			nd			nd			nd			nd			nd			nd			nd			nd	
Geometric mean		0.023			0.017			0.015			0.012			0.014			0.013			0.011			0.009			0.013	

(Note) 1. The values are the equivalent values to TBTO.

2. nd denotes no detection, "-" denotes not measured and blunk column denotes not monitored.

3. The geometric mean is calculated on condition that nd is the half of the detection limit.

Table 6-8 Results of the Survey of Triphenyltin Compound in Bottom Sediments
(Based on the Study and Survey of Designated Chemical Substances, etc. in Fiscal Year 1990－1998)

(Unit: μ g/g･dry (ppb))

Sampling spot	1990			1991			1992			1993			1994			1995			1996			1997			1998		
	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3	Sample 1	Sample 2	Sample 3
Mouth of Riv.Ishikari	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	-	-	-	-	-	-
Mouth of Riv.Tsutsumi																			nd	tr(0.0003)	nd	0.001	nd	nd	nd	nd	nd
Sendai Bay	0.004	0.004	0.003	0.001	0.002	0.002	0.005	0.005	0.009	0.003	0.005	0.003	0.006	-	-	-	-	-	0.003	0.003	0.003	0.003	0.002	0.002	0.002	0.033	0.002
Lake Hachiro	nd	nd	nd	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Onahama Port	0.006	0.045	0.066	0.011	0.017	0.011	nd	nd	nd	0.001	0.001	0.001	0.004	0.003	nd	0.001	0.001	nd	nd	nd	nd	0.008	nd	nd	0.014	0.001	0.002
Kasumigaura	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Coast of Ichihara and Anegasaki	0.019	0.030	0.0085	0.018	0.007	0.003	0.021	0.008	0.035	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.003	nd	nd	nd	0.0040	0.0032	0.0036
Mouth of Riv.Hanami																-	-	0.0028	-	-	-	-	-	-	nd	nd	nd
Mouth of Riv.Sumida	0.012	0.015	0.038	0.0025	0.0048	0.0019	0.0034	0.0039	0.0025	0.0032	0.0032	0.0032	0.0068	0.0067	0.0059	0.0027	0.0039	0.0029	0.0045	0.0044	0.0035	0.0019	0.0032	0.0020	0.0023	0.0033	0.0024
Mouth of Riv.Tamagawa	0.011	0.019	0.015	0.0030	0.0040	0.0052	0.014	0.018	0.016	0.0067	0.0058	0.0066	0.0026	0.0031	0.0041	0.0030	0.0027	0.0023	0.0042	0.0039	0.0045	0.0030	0.0035	0.0028	0.0041	0.0055	0.0063
Yokohama Port	0.031	0.039	0.038	0.040	0.087	0.032	0.007	0.003	0.009	0.018	0.024	0.009	0.010	0.018	0.012	0.013	0.014	0.007	0.22	0.028	0.014	0.11	0.028	0.015	0.014	0.019	0.014
Mouth of Riv.Shinano	0.003	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.0026	nd	nd	0.0026	nd	0.0012	0.0010	0.0010	nd	nd	nd	nd	0.0022	0.0057
Mouth of Riv.Sai	0.0031	nd	0.0070	nd	nd	0.0014	0.0056	nd	nd	nd	0.0009	0.0027	nd	nd	0.0021	nd	nd	nd	nd	nd	nd	nd	0.28	nd	nd	0.0025	nd
Lake Suwa	-	-	-	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Shimizu Port	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.001	0.001	0.001	0.002	0.001	0.002	0.0012	tr(0.0008)	0.0016	tr(0.0007)	tr(0.0009)	tr(0.0007)	tr(0.0006)	0.001	nd	0.004	0.003	0.001
Nagoya Port	0.011	0.001	0.016	0.006	nd	0.002	0.010	0.006	0.001	0.002	0.003	0.004	nd	0.006	nd	0.0046	0.0065	0.0038	0.013	0.027	0.019	0.006	0.011	0.009	0.017	0.044	0.008
Yokkaichi Port	0.022	0.007	0.005	0.0099	0.013	0.0080	0.024	0.013	0.016	0.0081	0.0070	0.0071	0.0042	0.019	-	0.015	nd	nd	0.0035	0.023	nd	tr(0.0009)	0.074	tr(0.0009)	0.0024	0.0014	0.0016
South of Lake Biwa	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	-	nd	nd	nd	nd	nd	nd	-	-	-
Miyazu Port	nd	nd	nd	0.0048	nd	nd	0.0019	0.0016	0.0018	nd	nd	nd	nd	0.0041	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	tr(0.00072)	nd
Miyamae Bridge of Riv.Katsura	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Mouth of Riv.Yamato	-	-	-	0.007	0.010	0.010	-	-	-	0.003	0.004	0.002	-	-	-	0.004	0.006	0.006	-	-	-	-	-	-	-	-	-
Osaka Port	0.13	0.094	0.11	nd	0.34	0.13	0.025	0.013	0.013	0.052	0.066	0.054	0.072	0.013	0.011	-	-	-	-	-	-	-	-	-	nd	nd	nd
Offshore of Himeji	0.011	0.018	0.024	0.0029	0.0087	0.0084	0.001	nd	0.001	-	-	-	-	-	-	nd	nd	nd	nd	nd	nd	-	-	-	nd	nd	nd
Offshore of Mizushima	0.021	0.028	0.058	0.022	0.012	0.050	0.0051	0.0043	0.0039	0.0009	0.0016	0.0006	0.0021	0.0015	nd	0.0017	0.0023	-	nd	nd	nd	nd	nd	nd	0.0027	0.0031	0.0013
Kure Port	0.038	0.067	0.041	0.038	0.049	0.065																					
Hiroshima Bay							0.011	0.028	0.010	0.010	0.0074	0.0076	0.016	0.0098	0.011	0.013	0.032	0.016	0.008	0.033	0.006	0.004	0.003	0.009	0.0041	0.0053	0.0047
Tokuyama Bay	0.001	tr(0.0008)	tr(0.0008)	tr(0.0005)	tr(0.0006)	tr(0.0005)	0.0019	0.0010	0.0010	0.0019	0.0012	0.0015	0.0026	0.0011	0.0015	0.0018	0.0012	0.0015	nd	nd	nd	0.0099	0.0023	0.0021	0.0039	0.0015	-
Mouth of Riv.Yoshino				nd	nd	nd	nd	nd	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Takamatsu Port	0.041	0.0091	0.0045	0.0036	0.0023	0.0010	0.0085	0.0032	0.0012	0.0029	0.0018	0.0007	0.0056	0.0031	0.0061	0.0078	0.0030	nd	0.0016	0.0074	0.0026	nd	nd	tr(0.0008)	0.0012	0.0018	0.0019
Mouth of Riv.Shimanto	nd	nd	nd	-	-	-	nd	nd	0.001	nd	nd	nd	tr(0.0008)	nd	0.013	0.012	nd	tr(0.0008)	nd	nd	nd	nd	nd	nd	0.002	-	-
Offshore of Omuta	-	-	-	0.0016	-	0.012	0.011	0.023	nd	0.001	0.012	0.004	-	-	0.013	0.019	0.028	0.11	0.001	nd	0.003	0.0082	0.0090	0.017	0.0014	tr(0.0007)	0.0012
Hakata Bay	0.0035	0.0032	0.0028	0.011	0.014	0.0083	0.0031	0.0033	0.0026	0.0040	0.0033	0.0044	0.0013	0.0013	0.0012	0.0013	0.0013	0.0026	0.0014	0.0015	0.0012	0.002	0.003	0.002	0.0019	0.0027	0.0022
Dokai Bay	0.056	0.077	0.099	0.019	0.16	0.060	0.090	0.033	-	0.15	0.052	0.022	0.26	0.12	0.04	0.067	0.011	0.0044	0.043	0.018	0.008	-	-	0.011	0.0066	0.065	0.0080
Imari Bay							0.0089	0.0059	0.0033	0.0086	0.016	0.0049	0.0099	0.015	0.005	0.003	0.003	0.003	0.010	0.006	0.007	0.022	0.010	0.011	0.0025	-	-
Nagasaki Port	0.028	0.010	0.007	0.026	0.009	0.012	0.0022	0.0023	0.0097	0.010	0.0079	0.0051	tr(0.0009)	tr(0.0009)	tr(0.0005)	0.0053	0.0038	0.013	0.022	0.010	0.011	0.0082	0.0090	0.017	0.013	0.017	0.020
Mouth of Riv.Oyodo	nd	nd	nd	nd	nd	0.001	nd	nd	nd	nd	nd	nd	nd	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Gotanda Bridge of Riv. Gotanda	nd	nd	nd	0.002	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Unified detction limit		0.001			0.001			0.001			0.001			0.001			0.001			0.001			0.001			0.001	
Detected frequency		52/81			55/89			57/95			55/96			47/88			48/93			41/99			39/91			54/94	
Maximum		0.13			0.34			0.09			0.15			0.26			0.11			0.22			0.28			0.065	
Minimum		nd			nd			nd			nd			nd			nd			nd			nd			nd	
Geometric mean		0.0048			0.0033			0.0023			0.0018			0.0022			0.0017			0.0014			0.0017			0.0015	

(Note) 1. The values are the equivalent values to TPTCl.

2. nd denotes no detection, "-" denotes not measured and blunk column denotes not monitored.

3. The geometric mean is calculated on condition that nd is the half of the detection limit.

Chapter 7.

Summary of the Results of the Follow-up Survey of the Situation of Pollution by Unintentionally Formed Chemical Substances (Fiscal Year 1998)

Chapter 7. Summary of the Results of the Follow-up Survey of the Situation of Pollution by Unintentionally Formed Chemical Substances (Fiscal Year 1998)

1. Purpose of the survey

Since the environmental pollution caused by chemical substances which are formed in the process of synthesis of chemical substances and in combustion became a problem, the Environment Agency has been conducting the Follow-up Survey of the Situation of Pollution by Harmful Chemical Substances since the fiscal year 1985, for the purpose of grasping the persistence in the general environment of the chemical substances unintentionally formed.
And in the fiscal year 1993, the survey was renamed as the Follow-up Survey of the Situation of Pollution by Unintentionally Formed Chemical Substances and has been conducted since then.

Until the fiscal year 1997 polychlorinated dibenzo-p-dioxins (PCDD), polychlorinated dibenzofurans (PCDF) and coplanar PCBs were subjected to the survey. And in the fiscal year 1998, it was interrupted to handle dioxins as the target substances of this survey, in order to avoid duplication with the National Overall Urgent Survey for Dioxins which was introduced for the purpose of grasping more detailed environmental pollution situation in the year.

In compensation, in the fiscal year 1998 the environmental survey was conducted on brominated dioxins (general name for polybrominated dibenzo-p-dioxins[PBDD] and polybrominated dibenzofurans[PBDF]). Summary of the results are as follows.

2. Summary of the survey

(1) Surveyed substances

PBDD (5 kinds): 2,3,7,8-T_4BrDD, 1,2,3,7,8-P_5BrDD, 1,2,3,4,7,8-H_6BrDD, 1,2,3,6,7,8-H_6BrDD, 1,2,3,7,8,9-H_6BrDD

PBDF (4 kinds): 2,3,7,8-T_4BrDF, 1,2,3,7,8-P_5BrDF, 2,3,4,7,8-P_5BrDF, 1,2,3,4,7,8-H_6BrDF

(2)Surveyed media

Bottom sediments, wildlife (fishes)

(3) Surveyed areas

Rivers, lakes and marshes and seas (ports and bays) from all over Japan: 29 areas

(4) Analytical method

Quantitative analysis by the SIM method using gas chromatography/mass spectrometer (GC/MS).

3. Survey results

The results are indicated in Table 7-1 and 7-2 and summarized as follows.

(1) PBDD: PBDD were not detected in bottom sediments and wildlife in all areas.

(2) PBDF: PBDF were not detected in bottom sediments and wildlife in all areas.

4. Evaluation of survey results

Although pollution of the general environment by brominated dioxins was not observed by the present survey/analytical method, it is necessary in future to develop more sensitive analytical method and to grasp the situation of persistence in the environment by surveys using the method.

Besides, since there is few information related to brominated dioxins, it is necessary in future to collect the related information and to endeavor to elucidate the pollution mechanism such as sources and environmental fate and to use effort to gather toxicology related knowledge.

Fig.7-1 Locations of the Follow-up Survey of the Situation of Pollution by Unintentionally Formed Chemical Substances (Fiscal Year 1998)

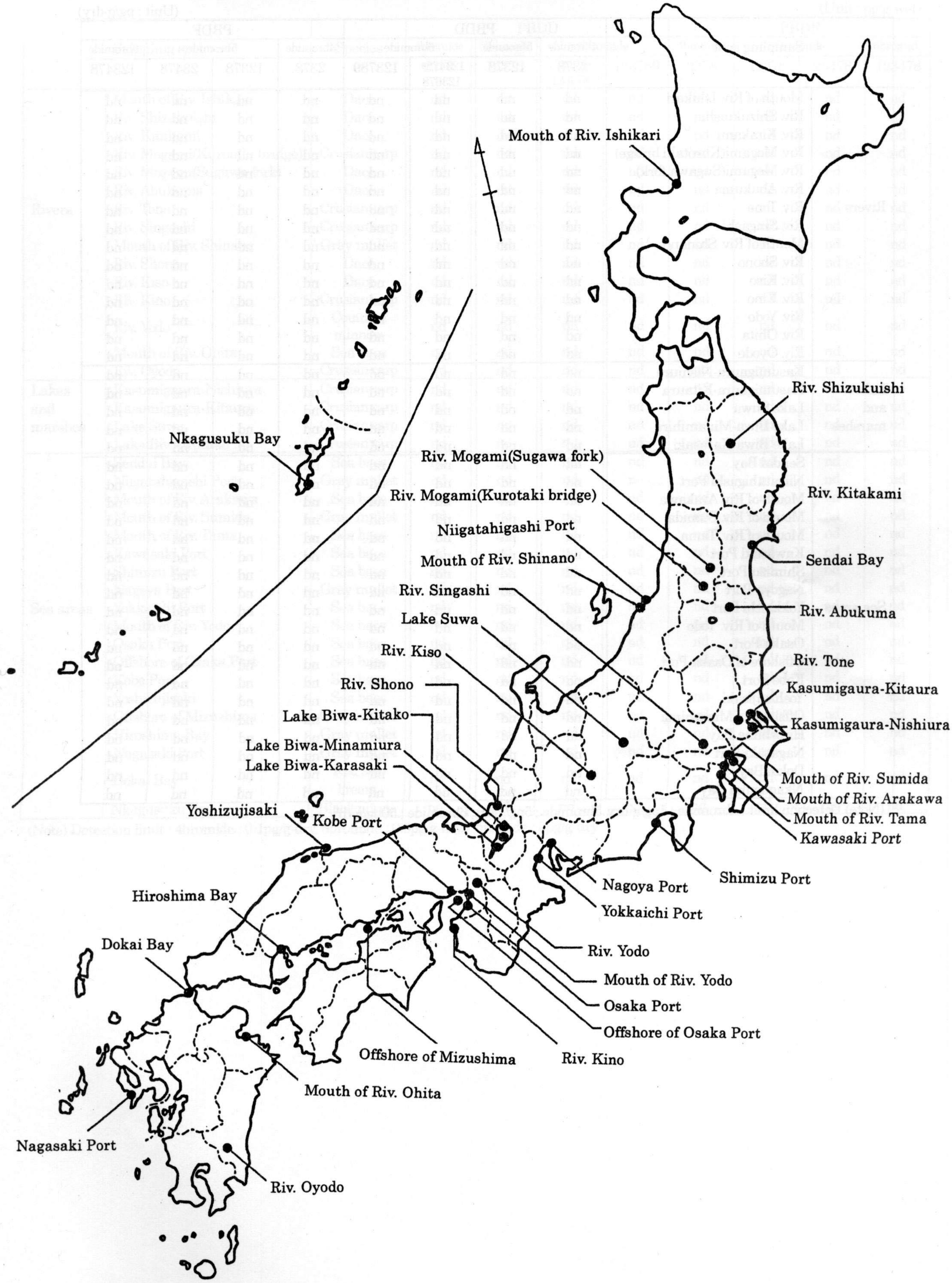


Table 7-1 Survey Results of Fiscal Year 1998 for Brominated Dioxins (Bottom sediments)

(Unit : pg/g-dry)

Sampling spot		PBDD				PBDF			
		4bromide	5bromide	6bromide		4bromide	5bromide		6bromide
		2378	12378	123478+ 123678	123789	2378	12378	23478	123478
Rivers	Mouth of Riv. Ishikari	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Shizukuishi	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Kitakami	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Mogami(Kurotaki bridge)	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Mogami(Sugawa fork)	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Abukuma	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Tone	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Singashi	nd	nd	nd	nd	nd	nd	nd	nd
	Mouth of Riv. Shinano	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Shono	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Kiso	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Kino	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Yodo	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Ohita	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Oyodo	nd	nd	nd	nd	nd	nd	nd	nd
Lakes and marshes	Kasumigaura-Nishiura	nd	nd	nd	nd	nd	nd	nd	nd
	Kasumigaura-Kitaura	nd	nd	nd	nd	nd	nd	nd	nd
	Lake Suwa	nd	nd	nd	nd	nd	nd	nd	nd
	Lake Biwa-Minamihira	nd	nd	nd	nd	nd	nd	nd	nd
	Lake Biwa-Karasaki	nd	nd	nd	nd	nd	nd	nd	nd
Sea areas	Sendai Bay	nd	nd	nd	nd	nd	nd	nd	nd
	Niigatahigashi Port	nd	nd	nd	nd	nd	nd	nd	nd
	Mouth of Riv. Arakawa	nd	nd	nd	nd	nd	nd	nd	nd
	Mouth of Riv. Sumida	nd	nd	nd	nd	nd	nd	nd	nd
	Mouth of Riv. Tama	nd	nd	nd	nd	nd	nd	nd	nd
	Kawasaki Port	nd	nd	nd	nd	nd	nd	nd	nd
	Shimizu Port	nd	nd	nd	nd	nd	nd	nd	nd
	Nagoya Port	nd	nd	nd	nd	nd	nd	nd	nd
	Yokkaichi Port	nd	nd	nd	nd	nd	nd	nd	nd
	Mouth of Riv. Yodo	nd	nd	nd	nd	nd	nd	nd	nd
	Osaka Port	nd	nd	nd	nd	nd	nd	nd	nd
	Offshore of Osaka Port	nd	nd	nd	nd	nd	nd	nd	nd
	Kobe Port	nd	nd	nd	nd	nd	nd	nd	nd
	Yoshizujisaki	nd	nd	nd	nd	nd	nd	nd	nd
	Offshore of Mizushima	nd	nd	nd	nd	nd	nd	nd	nd
	Hiroshima Bay	nd	nd	nd	nd	nd	nd	nd	nd
	Nagasaki Port	nd	nd	nd	nd	nd	nd	nd	nd
	Dokai Bay	nd	nd	nd	nd	nd	nd	nd	nd
	Nkagusuku Bay	nd	nd	nd	nd	nd	nd	nd	nd

(Note) Detection limit : 4bromide ; 1pg/g-dry, 5bromide ; 5pg/g-dry, 6bromide ; 50pg/g-dry

Table 7-2 Survey Results of Fiscal Year 1998 for Brominated Dioxins (Wildlife)

(Unit : pg/g-wet)

Sampling spot		Species	PBDD				PBDF			
			4bromide	5bromide	6bromide		4bromide	5bromide		6bromide
			2378	12378	123478+ 123678	123789	2378	12378	23478	123478
Rivers	Mouth of Riv. Ishikari	Dace	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Shizukuishi	Dace	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Kitakami	Dace	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Mogami(Kurotaki bridge)	Crusian carp	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Mogami(Sugawa fork)	Dace	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Abukuma	Dace	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Tone	Crusian carp	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Singashi	Crusian carp	nd	nd	nd	nd	nd	nd	nd	nd
	Mouth of Riv. Shinano	Gray mullet	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Shono	Dace	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Kiso	Dace	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Kino	Crusian carp	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Yodo	Common minnow	nd	nd	nd	nd	nd	nd	nd	nd
	Mouth of Riv. Ohita	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd
	Riv. Oyodo	Crusian carp	nd	nd	nd	nd	nd	nd	nd	nd
Lakes and marshes	Kasumigaura-Nishiura	Crusian carp	nd	nd	nd	nd	nd	nd	nd	nd
	Kasumigaura-Kitaura	Crusian carp	nd	nd	nd	nd	nd	nd	nd	nd
	Lake Suwa	Crusian carp	nd	nd	nd	nd	nd	nd	nd	nd
	Lake Biwa-Kitako	Crusian carp	nd	nd	nd	nd	nd	nd	nd	nd
Sea areas	Sendai Bay	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd
	Niigatahigashi Port	Gray mullet	nd	nd	nd	nd	nd	nd	nd	nd
	Mouth of Riv. Arakawa	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd
	Mouth of Riv. Sumida	Gray mullet	nd	nd	nd	nd	nd	nd	nd	nd
	Mouth of Riv. Tama	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd
	Kawasaki Port	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd
	Shimizu Port	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd
	Nagoya Port	Gray mullet	nd	nd	nd	nd	nd	nd	nd	nd
	Yokkaichi Port	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd
	Mouth of Riv. Yodo	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd
	Osaka Port	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd
	Offshore of Osaka Port	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd
	Kobe Port	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd
	Yoshizujisaki	Sea bass	nd	nd	nd	nd	nd	nd	nd	nd
	Offshore of Mizushima	Gray mullet	nd	nd	nd	nd	nd	nd	nd	nd
	Hiroshima Bay	Gray mullet	nd	nd	nd	nd	nd	nd	nd	nd
	Nagasaki Port	Gray mullet	nd	nd	nd	nd	nd	nd	nd	nd
	Dokai Bay	Red sea-bream	nd	nd	nd	nd	nd	nd	nd	nd
	Nkagusuku Bay	Black porgy	nd	nd	nd	nd	nd	nd	nd	nd

(Note) Detection limit : 4bromide ; 0.1pg/g-dry, 5bromide ; 0.5pg/g-dry, 6bromide ; 5pg/g-dry

Appendix A

Outline of the Chemical Substances Control Law

Appendix A Outline of the Chemical Substances Control Law

The Chemical Substances Control Law was enacted in October, 1973, as a result of the environmental pollution caused by PCB, and was enforced in April, 1974. With this Law, new chemical substances are examined before manufacture or import whether they do not change chemically in nature (low biodegradability), are easily accumulated in biological organisms (high bioaccumulation) and have the suspicions of toxicity to human health when taken for a long period of time (chronic toxicity). (That is, the system of examination of new chemical substances before manufacture or import). Substances with the above properties were designated as Class 1 Specified Chemical Substances, and their manufacture, import and use etc., were restricted. There have been 6,876 notifications for new chemical substances (5,136 for manufacture and 1,740 for import) and 5,349 (4,083 for manufacture and 1,266 for import) have been examined and recognized as safe (as of the end of December, 1998).

On the other hand, existing chemical substances have been examined for safety in principle by the government, based on the resolution of the National Diet at the time of the enactment of the Chemical Substances Control Law in the 1973, and if necessary, they are designated as a Class 1 Specified Chemical Substances etc..

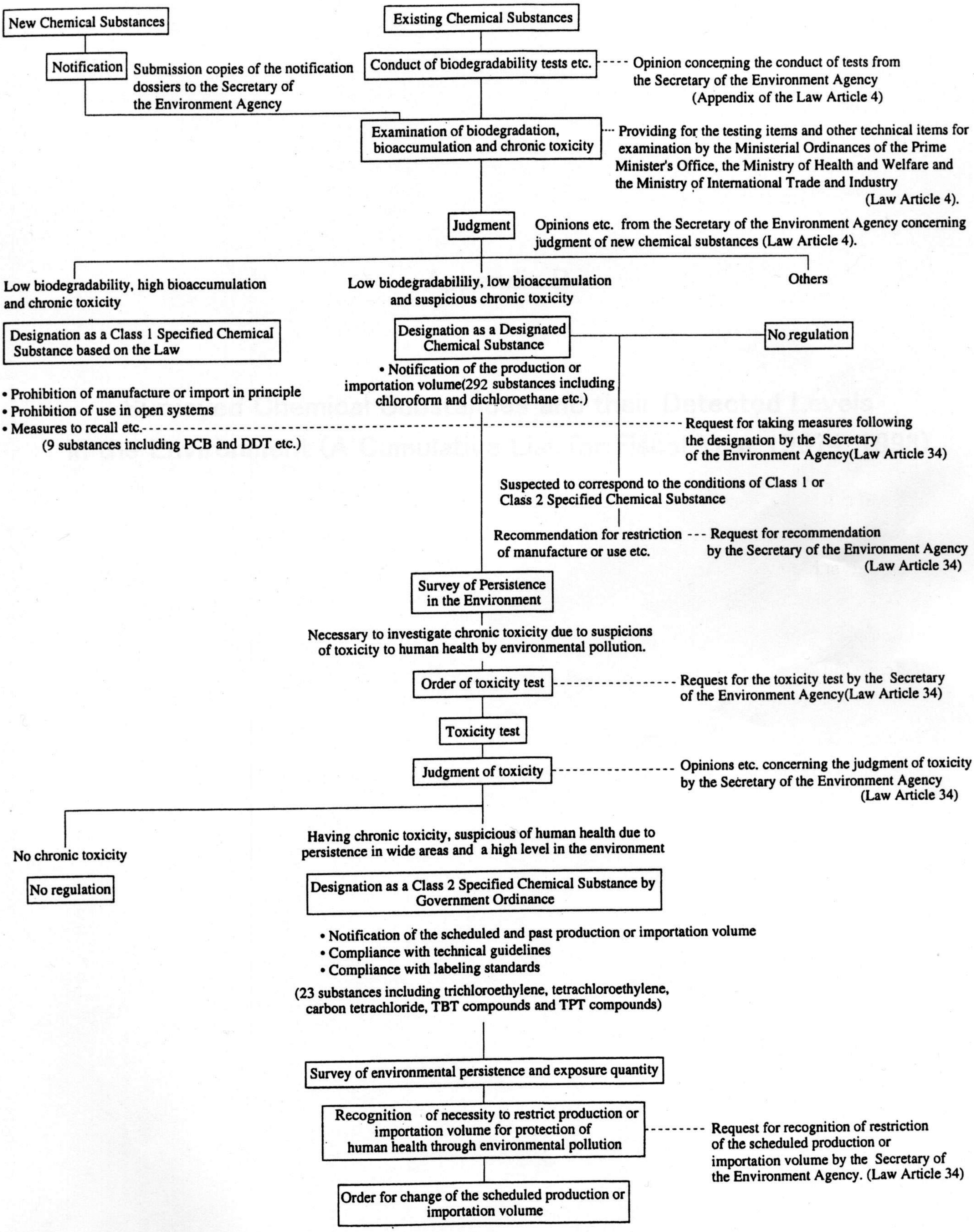
Existing Chemical Substances were investigated their biodegradability by microorganisms and bioaccumulation in fishes and shellfishes by the Ministry of International Trade and Industry, their toxicity by the Ministry of Health and Welfare and the situation of their persistence in the general environment and effects to ecosystem by the Environment Agency. So far, the 9 substances PCB, HCB, PCN, aldrin, dieldrin, endrin, DDT, chlordanes and bis(tributyltin) oxide have been designated as Class 1 Specified Chemical Substances (as of the end of October, 1999).

The Law was amended in May, 1986, as a result of ground water pollution by trichloroethylene etc., and was enforced in April, 1987. Since this amendment, substances with low bioaccumulation but low biodegradability and suspicion of chronic toxicity are designated as Designated Chemical Substances, and their production or importation volume are reported. If toxicity to human health is expected by environmental pollution caused by these Designated Chemical Substances, governmental order of conduct and report of toxicity test takes place for manufacturers etc., and if toxicity is observed, these substances are to be designated as Class 2 Specified Chemical Substances, and the production or importation volume etc. are regulated. So far, 292 substances including chloroform and 1,2-dichloroethane have been designated as Designated Chemical Substances. Concerning Class 2 Specified Chemical Substances, 3 substances i.e., carbon tetrachloride, tetrachloroethylene and trichloroethylene were designated as Class 2 Specified Substances for the first time from Designated Chemical Substances in April, 1989, and so far 23

substances have been designated as above (as of the end of October, 1999).
The system of the Chemical Substances Control Law has been indicated in Figure 1, and in this framework the Environment Agency has the following responsibilities and authorities.

① To provide for testing items and other technical items for the examination of new chemical substances by the Ministerial Ordinances of the Prime Minister's Office, the Ministry of Health and Welfare and the Ministry of International Trade and Industry (Article 4 Clause 5).
② To request for necessary explanation and express opinions to the Minister of Health and Welfare and the Minister of International Trade and Industry by the examination and judgment of new chemical substances (Article 4 Clause 7)
③ To request to the competent minister to take measures (Article 34 Clause 1) following the designation of a Class 1 Specified Chemical Substance (Article 22)
④ To request to the Ministers of Health and Welfare and International Trade and Industry (Article 34 No. 2) to order toxicity test concerning Designated Chemical Substances (Article 24 Clause 1)
⑤ To request to the Ministers of Health and Welfare and International Trade and Industry (Article 34 No.3) to recognize the necessity to restrict the manufacture etc. of Class 2 Specified Chemical Substances (Article 26 No. 4)
⑥ To request to the competent minister (Article 34 No. 4) to make the necessary recommendations concerning the restriction of the manufacture, import and use etc. of chemical substances (Article 29) when there is sufficient reason to suspect as Class 1 Specified Substances concerning substances other than Class 1 Specified Chemical Substances, and as Class 2 Specified Chemical Substances concerning those other than Class 2 Specified Chemical Substances.
⑦ To express opinions whether existing chemical substances correspond to Designated Chemical Substances etc. when the Ministers of Health and Welfare and International Trade and Industry conduct toxicity tests (Supplementary Regulations Article 4)

Figure 1 The System of the Law Concerning the Examination and Manufacture etc. of Chemical Substances



The numbers in parenthesis indicate chemical substances designated as of October,1999.

Appendix B

Surveyed Chemical Substances and their Detected Levels in the Environment (A Cumulative List for Fiscal Year 19674-1998)

Surveyed Chemical Substances and their Detected Levels in the Environment
(A Cumulative List for Fiscal Year 1974 - 1998)

A/B: Number of detections / Number of samples; C/D: Number of detected stations / Number of sampling stations;
Unit: Water ng/ml; Sediment ug/g-dry; Fishes ug/g-wet; Air ppb or ng/m3 at 20degreeC 1atm

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
1	acrylamide	79-06-1	1975	0/95		---	(1)													1
			1991	11/153		0.05 - 0.1	(0.05)	20/150		0.00052 - 0.003	(0.0005)	0/147		---	(0.0013)					
			1998	0/33	0/11	---	(0.15)	0/30	0/10	---	(0.009)									
2	ethyl acrylate	140-88-5	1980	0/51		---	(0.3 - 50)	0/51		---	(0.0041 - 0.12)									2
3	2-ethylhexylacrylate	103-11-7	1980	0/51		---	(1.1 - 12)	0/24		---	(0.04 - 0.13)									3
4	butyl acrylate	141-32-2	1980	0/51		---	(0.7 - 30)	0/51		---	(0.0080 - 0.07)									4
5	methyl acrylate	96-33-3	1980	0/51		---	(0.6 - 50)	0/51		---	(0.0083 - 0.12)									5
6	acrylonitrile	107-13-1	1977	0/ 9		---	(20 - 50)	0/ 9		---	(0.4 - 0.5)									6
			1987	0/75		---	(2)	4/66		0.014 - 0.114	(0.007)					A 16/65		42 - 2,400ng/m3	(40)	
			1991													A 15/40		46 - 390ng/m3	(40)	
			1992	0/162		---	(2.2)	8/151		0.007 - 0.016	(0.007)	0/144		---	(0.01)					
7	acrolein	107-02-8	1978	0/21		---	(7 - 10)	0/15		---	(0.02 - 0.1)									7
			1987	0/75		---	(1.9)									A 0/61		--- ng/m3	(800)	
8	adipic acid	124-04-9	1985	0/27		---	(2)	6/27		0.07 - 0.41	(0.03)									8
9	diisodecyl adipate	6938-94-9	1978	0/30		---	(0.8 - 100)	0/30		---	(0.04 - 5)									9
10	octyl adipate	103-23-1	1978	0/30		---	(0.4 - 25)	0/30		---	(0.02 - 1)									10
			1984													A 47/72		0.23 - 16.7ng/m3	(0.1 - 0.61)	
			1995	0/33		---	(0.7)	11/29		0.016 - 0.1	(0.012)					A 31/41		1.0 - 22ng/m3	(1)	
			1998													A 26/33	11/12	1 - 26ng/m3	(1)	
11	dibuthyldiglycol adipate	141-17-3	1978	0/30		---	(0.8 - 50)	0/30		---	(0.04 - 2)									11
12	adiponitrile	111-69-3	1978	0/21		---	(10)	0/21		---	(0.1 - 0.3)									12
13	azinphosmethyl	86-50-0	1993													A 0/24		--- ng/m3	(21)	13
14	acetaldehyde	75-07-0	1977	0/ 6		---	(10)	3/ 6		2 - 4	(2.5)									14
			1987	0/75		---	(1)									A 43/57		930 - 22,000ng/m3	(800)	
			1995	0/33		---	(1)									A 46/47		1,80 - 45,000ng/m3	(500)	

Surveyed Chemical Substances and their Detected Levels in the Environment
(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
15	acetonitrile	75-05-8	1977	0/9		---	(120 - 200)	0/ 9		---	(2 - 24)									15
			1987	0/72		---	(3)	11/60		0.021 - 0.54	(0.021)					A 44/70		210 - 42,000ng/m3	(200)	
			1991													A 33/51		200 - 3,700ng/m3	(200)	
			1992	15/147		1.1 - 7.4	(1)	25/155		0.03 - 1.9	(0.03)									
16	acetone	67-64-1	1995													A 49/49		150 - 31,000ng/m3	(2)	16
17	acenaphthylene	208-96-8	1983	0/33		---	(0.06 - 0.4)	13/33		0.008 - 0.053	(0.008 - 0.041)									17
			1984	4/138		0.08 - 1.3	(0.002 - 1)	63/138		0.0007 - 0.671	(0.00006 - 0.088)	14/138		0.0008 - 0.024	(0.0002 - 0.05)					
18	acenaphthene	83-32-9	1983	0/33		---	(0.09 - 0.4)	13/33		0.008 - 0.13	(0.008 - 0.041)									18
			1984	3/138		0.05 - 0.1	(0.001 - 1)	58/138		0.00004 - 0.084	(0.00004 - 0.088)	15/138		0.001 - 0.50	(0.0001 - 0.05)					
19	acephate	30560-19-1	1993	0/30		---	(0.2)	0/30		---	(0.02)	0/30		---	(0.01)					19
20	azobisisobutyronitrile	78-67-1	1979	0/15		---	(10)	0/15		---	(0.1)									20
21	o-anisidine	90-04-0	1976	6/68		0.2 - 1.3	(0.2 - 0.8)	27/68		0.003 - 0.079	(0.003 - 0.004)									21
			1990	2/48		0.02 - 0.027	(0.02)	3/41		0.0067 - 0.0073	(0.005)	0/54		---	(0.002)	A 0/51		--- ng/m3	(500)	
22	m-anisidine	536-90-3	1976	3/68		0.016 - 0.028	(0.01 - 0.2)	6/68		0.0004 - 0.018	(0.0002 - 0.0016)									22
			1990	5/48		0.02 - 0.058	(0.02)	0/57		---	(0.02)	1/54		0.0046	(0.002)	A 0/51		--- ng/m3	(500)	
23	p-anisidine	104-94-9	1976	4/68		0.06 - 0.72	(0.06 - 0.2)	12/68		0.001 - 0.006	(0.0007 - 0.004)									23
			1990	0/57		---	(0.4)	0/54		---	(0.017)	0/54		---	(0.02)	A 0/51		--- ng/m3	(1,500)	
24	aniline	62-53-3	1976	40/68		0.02 - 28	(0.04 - 0.2)	48/68		0.0007 - 0.50	(0.0008)									24
			1990	33/104		0.02 - 0.33	(0.02)	81/116		0.003 - 0.24	(0.002)	27/89		0.001 - 0.0077	(0.001)	A 1/48		480ng/m^3	(150)	
			1997													A 1/42		18ng/m^3	(15)	
			1998	1/141	1/47	0.074	(0.06)	95/120	36/43	0.0021 - 0.21	(0.002)									
25	1-aminoanthraquinone	82-45-1	1985	0/27		---	(0.2)	1/21		0.022	(0.02)									25
26	2-aminoanthraquinone	117-79-3	1985	0/27		---	(0.6)	0/18		---	(0.04)									26
27	2-amino-5-chloro-4-methylbenzenesulfonic acid	88-53-9	1980	0/24		---	(10 - 200)	0/24		---	(0.5 - 11)									27
28	3-amino-1,2,4-triazole	61-82-5	1984	0/24		---	(4)	0/24		---	(0.005 - 0.02)									28
29	1-aminonaphthalene-4-sulfonic acid	84-86-6	1985	0/33		---	(0.5)	0/33		---	(0.007)									29
30	2-aminonaphthalene-1-sulfonic acid	81-16-3	1985	0/30		---	(0.5)	0/30		---	(0.007)									30
31	2-aminonaphthalene-5-sulfonic acid	81-05-0	1985	0/33		---	(0.5)	0/33		---	(0.007)									31

Surveyed Chemical Substances and their Detected Levels in the Environment
(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
32	2-aminonaphthalene-6-sulfonic acid	93-00-5	1985	0/33		---	(0.5)	0/33		---	(0.007)									32
33	2-aminonaphthalene-7-sulfonic acid	494-44-0	1985	0/33		---	(0.5)	0/33		---	(0.007)									33
34	2-aminonaphthalene-8-sulfonic acid	86-06-2	1985	0/33		---	(0.5)	0/33		---	(0.007)									34
35	1-amino-8-naphthol-3,6-disulfonic acid	90-20-0	1980	0/24		---	(4)	0/24		---	(0.04 - 0.1)									35
36	2-amino-5-naphthol-7-sulfonic acid	87-02-5	1980	0/24		---	(4)	0/24		---	(0.04 - 0.1)									36
37	2-aminobiphenyl	90-41-5	1977	0/ 6		---	(0.05)	0/ 3		---	(0.02)									37
38	2-aminopyridine	504-29-0	1983	0/30		---	(0.1 - 0.4)	0/30		---	(0.002 - 0.05)									38
39	3-aminopyridine	462-08-8	1983	0/30		---	(0.1 - 2)	0/30		---	(0.002 - 0.098)									39
40	4-aminopyridine	504-24-5	1983	0/30		---	(0.1 - 3)	0/30		---	(0.005 - 0.12)									40
41	o-aminophenol	95-55-6	1986	0/27		---	(0.1)	0/27		---	(0.02)									41
42	m-aminophenol	591-27-5	1986	1/27		1.1	(0.7)	0/27		---	(0.03)									42
43	p-aminophenol	123-30-8	1986	0/27		---	(0.8)	0/27		---	(0.05)									43
44	3-aminobenzenesulfonic acid	121-47-1	1981	0/ 6		---	(60)	0/ 6		---	(0.5)									44
45	1-amino-2-methylanthraquinone	82-28-0	1986	0/30		---	(0.2)	0/30		---	(0.2)									45
46	1-amino-2-methoxy-5-methylbenzene	120-71-8	1985	0/27		---	(0.6)	0/27		---	(0.03)									46
47	allylamine	107-11-9	1981	0/27		---	(0.7 - 4)	0/27		---	(0.007 - 0.01)									47
48	3-allyloxy-1,2-benzisothiazole-1,1-dioxide	27605-76-1	1992	0/75		---	(0.11)	0/75		---	(0.011)	0/72		---	(0.023)					48
49	tris(2-chloroethyl)phosphite	140-08-9	1984	0/24		---	(3 - 40)	0/24		---	(0.07 - 8.8)									49
50	sodium alkyl benzene sulfonate(straight chain)		1977	9/51		280 - 29,000	(10)	21/51		1.0 - 260	(1)									50
51	sodium alkyl benzene sulfonate(branched chain)		1977	0/51		---	(10)	0/51		---	(1)									51
52	aldrin	309-00-2	1974	0/60		---	(0.1)	0/60		---	(0.01)	0/60		---	(0.005)					52
53	benzoic acid	65-85-0	1985	3/33		5 - 6	(4)	24/33		0.05 - 4.58	(0.04)									53
			1986	31/111		0.2 - 2.1	(0.2)	112/146		0.02 - 2.0	(0.02)	113/137		0.005 - 0.31	(0.005)					
54	anthraquinone	84-65-1	1988	0/75		---	(0.2)	21/53		0.018 - 3.7	(0.018)									54
			1989	0/66		---	(0.18)	20/67		0.015 - 0.16	(0.015)									
55	anthracene	120-12-7	1976	0/20		---	(0.1)	4/20		0.01 - 0.28	(0.01)									55
			1977	0/ 9		---	(0.02 - 3)	6/ 9		0.015 - 1.2	(0.004)									
56	isoxathion	18854-01-8	1993													A 0/54		--- ng/m3	(100)	56

Surveyed Chemical Substances and their Detected Levels in the Environment
(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
57	isocyanuric acid	108-80-5	1983	0/30		---	(2 - 4)	0/30		---	(0.025 - 0.24)									57
58	isophthalic acid	121-91-5	1983	0/24		---	(1 - 20)	0/24		---	(0.02 - 0.1)									58
59	isophthalonitrile	626-17-5	1977	0/ 6		---	(1 - 5)	0/ 6		---	(0.1 - 1)									59
60	isobutyronitrile	78-82-0	1977	0/ 3		---	(1)	0/ 3		---	(0.2)									60
			1987	0/75		---	(0.7)	0/75		---	(0.006)					A 0/61		--- ng/m3	(200)	
61	isoprene	78-79-5	1978	0/12		---	(1)	0/12		---	(0.001)									61
62	isopropanolamine	78-96-6	1980	0/27		---	(3 - 110)	0/27		---	(0.006 - 0.58)									62
63	isopropylamine	75-31-0	1980	0/27		---	(0.5 - 33)	0/27		---	(0.001 - 0.18)									63
			1981	0/27		---	(0.6 - 4)	0/27		---	(0.006 - 0.01)									
64	2-isopropylnaphthalene	2027-17-0	1984	0/18		---	(0.006 - 0.2)	1/18		0.021	(0.0004 - 0.012)									64
			1985	0/141		---	(0.2)	1/141		0.032	(0.03)	3/120		0.002	(0.002)					
65	isopropylbenzene	98-82-8	1977	0/ 3		---	(2)	0/ 3		---	(0.004)									65
			1985	0/27		---	(0.04)	1/27		0.0006	(0.0006)									
			1986	8/135		0.09 - 0.44	(0.03)	6/111		0.00058 - 0.011	(0.0005)	12/138		0.0005 - 0.0014	(0.0005)					
66	3-(1-methylethyl)-1H-2,1,3-benzothiadiazin-4(3H)-one 2,2-dioxide	25057-89-0	1992	1/75		6.7	(2)	0/75		---	(0.2)	0/72		---	(0.15)					66
67	EPN	2104-64-5	1986	0/39		---	(0.3)	0/39		---	(0.03)									67
			1993													A 0/54		--- ng/m3	(50)	
68	iprobenfos	26087-47-8	1993	13/165		0.1 - 1.6	(0.094)	2/168		0.038 - 0.039	(0.037)	4/153		0.017 - 0.048	(0.016)	A 0/24		--- ng/m3	(3)	68
69	anionic surfactants		1974	26/60		0.16	(0.05)													69
70	1,2-ethanediol	107-21-1	1977	0/ 6		---	(100 - 400)	0/ 6		---	(1 - 2.0)									70
			1986	2/24		1.3 - 2.0	(0.8)	0/24		---	(0.06)									
71	N-ethylaniline	103-69-5	1976	2/68		0.43 - 0.58	(0.1 - 0.6)	20/68		0.002 - 0.038	(0.002 - 0.008)									71
			1990	0/54		---	(0.05)	0/63		---	(0.05)	0/54		---	(0.0043)	A 1/36		160ng/m^3	(130)	
72	ethylamine	75-04-7	1981	0/27		---	(0.8 - 2)	0/27		---	(0.005 - 0.01)									72
73	2-ethylanthraquinone	84-51-5	1985	0/33		---	(0.3)	0/33		---	(0.05)									73
74	ethylthiometon	298-04-4	1993													A 0/27		--- ng/m3	(2)	74
75	ethylbiphenyl	40529-66-6	1976	0/68		---	(0.6 - 20)	0/50		---	(0.16 - 20)	0/20		---	(0.12 - 0.5)					75
76	o-ethylphenol	90-00-6	1983	0/33		---	(0.04 - 0.2)	0/33		---	(0.001 - 0.02)									76
77	m-ethylphenol	620-17-7	1983	0/33		---	(0.06 - 0.3)	0/33		---	(0.001 - 0.02)									77
78	p-ethylphenol	123-07-9	1983	0/33		---	(0.06 - 0.3)	0/33		---	(0.001 - 0.02)									78
79	2-ethylhexanol	104-76-7	1979	0/30		---	(0.002 - 200)	0/30		---	(0.00003 - 2)									79
			1995	0/33		---	(6)	0/33		---	(0.61)									

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection: Water(ng/ml) A/B	C/D	Range of detection	Limit of detection	Sediment(ug/g-dry) A/B	C/D	Range of detection	Limit of detection	Fishes(ug/g-wet) A/B	C/D	Range of detection	Limit of detection	Others A:Air; R:Rain Water; P:Plankton A/B	C/D	Range of detection	Limit of detection	#
80	S-ethyl perhydroazepine-1-thiocarboxylate	2212-67-1	1992	1/42		0.077	(0.02)	1/42		0.0037	(0.002)	0/42		---	(0.006)	A 0/49		--- ng/m3	(10)	80
81	ethylbenzene	100-41-4	1977	0/ 3		---	(2)	0/ 3		---	(0.004)									81
			1985	0/21		---	(0.02)	3/21		0.0009 - 0.0027	(0.0008)									
			1986	7/133		0.03 - 1.1	(0.03)	28/120		0.0005 - 0.028	(0.0005)	43/138		0.001 - 0.0098	(0.001)					
82	N-ethylmorpholine	100-74-3	1979	0/33		---	(1 - 30)	0/33		---	(0.01 - 0.7)									82
83	ethylene	74-85-1	1977	1/ 6		0.1	(0.05 - 5)	3/ 6		0.0002 - 0.0006	(0.005)									83
84	ethylene oxide	75-21-8	1980	0/36		---	(0.2 - 5)	0/12		---	(0.001 - 0.003)									84
			1996													A 42/51		30 - 300ng/m3	(25)	
85	ethylene chlorohydrin	107-07-3	1980	0/24		---	(0.3 - 5)	0/24		---	(0.02 - 0.20)									85
86	ethylenediaminetetra acetic acid	60-00-4	1979	0/18		---	(10 - 20)	5/24		2.3 - 13	(0.2 - 2.0)									86
			1994	4/21		17.3 - 27	(6.2)	0/21		---	(0.14)	0/18		---	(0.33)					
87	edifenphos	17109-49-8	1993	0/51		---	(0.64)	0/51		---	(0.1)									87
88	4-ethoxyaniline	156-43-4	1977	0/ 6		---	(1 - 5)	0/ 6		---	(0.5 - 1.0)									88
			1985	0/33		---	(0.05)	0/33		---	(0.005)									
			1998	1/39	1/13	0.36	(0.3)	0/39	0/13	---	(0.02)									
89	2-ethoxyethanol	110-80-5	1976	0/60		---	(90 - 100)	0/20		---	(0.4)									89
90	6-ethoxy-1,2-dihydro-2,2,4-trimethylquinoline	91-53-2	1980	0/42		---	(1 - 10)	0/42		---	(0.1 - 1.4)									90
91	1,2-epoxy-3-phenoxypropane	122-60-1	1984	0/24		---	(0.1 - 0.6)	0/24		---	(0.006 - 0.02)									91
92	2,3-epoxy-1-propanol	556-52-5	1983	0/30		---	(2 - 5)	0/30		---	(0.01 - 0.05)									92
93	allyl chloride	107-05-1	1977	0/ 6		---	(5)													93
94	alkyl-benzyl-dimethylammonium chloride *	8001-54-5 68391-01-5	1982	0/24		---	(3)	9/24		0.8 - 10.5	(0.1)									94
			1983	0/126		---	(1 - 3)	30/126		0.1 - 5.2	(0.1 - 0.6)	0/123		---	(0.1 - 1)					
*Total of compounds with alkyl chains having 12,14 or 16 carbons																				
95	ethyl chloride	75-00-3	1977	0/ 3		---	(0.04)	0/ 3		---	(0.0002)									95
			1979													A 8/46		0.043 - 20ppb	(0.006 - 3)	
			1980													A 7/117		0.068 - 0.6ppb	(0.045 - 3)	
			1983													A 56/102		0.012 - 0.776ppb	(0.011 - 0.03)	

Surveyed Chemical Substances and their Detected Levels in the Environment
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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection: Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				#
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
96	vinyl chloride	75-01-4	1975	5/100		0.1	(0.05 - 40)													96
			1979													A 7/45		0.022 - 4.0ppb	(0.002 - 2)	
			1980													A 10/117		0.020 - 1.35ppb	(0.02 - 2)	
			1997	12/129		0.014 - 0.25	(0.011)	5/120		0.038 - 0.005	(0.0035)					A 40/53		18 - 2000ng/m3	(15)	
			1998													A 31/36	12/13	16 - 1300ng/m3	(14)	
97	benzyl chloride	100-44-7	1976	0/60		---	(30 - 100)	0/53		---	(0.4 - 1.0)	0/ 2		---	(1.0)					97
			1989	0/63		---	(0.2)	0/66		---	(0.01)					A 5/21		6.4 - 8.3ng/m3	(5)	
98	methyl chloride	74-87-3	1979													A 30/45		0.28 - 2.2ppb	(0.02 - 1)	98
			1980													A 61/99		0.048 - 3.0ppb	(0.014 - 1)	
			1983													A 98/101		0.077 - 4.1ppb	(0.005 - 0.054)	
99	chlorinated paraffins	63449-39-8	1979	0/51		---	(10)	24/51		0.6 - 10	(0.5)									99
			1980	0/120		---	(10)	31/120		0.5 - 8.5	(0.5)	0/108		---	(0.5)					
100	endosulfan sulfate	1031-07-8	1983	0/36		---	(0.03 - 0.4)	0/36		---	(0.003 - 0.054)									100
101	endrin	72-20-8	1974	0/60		---	(0.1)	0/60		---	(0.01)	0/60		---	(0.005)					101
102	oxychlordane	26880-48-8	1982	0/126		---	(0.005)	3/126		0.0002 - 0.0003	(0.0002 - 0.001)	47/123		0.001 - 0.009	(0.001)					102
			1986													A 0/73		--- ng/m3	(1.5)	
103	octanol	111-87-5, 29063-28-3	1979	0/27		---	(5 - 50)	0/27		---	(0.3 - 1)									103
104	2-octanol	123-96-6	1995	0/33		---	(2)	0/33		---	(0.2)					A 10/18		4.2 - 130ng/m3	(4)	104
105	octabromodiphenyl ether	32536-52-0	1987	0/75		---	(0.1)	3/51		0.008 - 0.021	(0.007)	0/75		---	(0.005)					105
			1988	0/147		---	(0.07)	3/135		0.015 - 0.022	(0.005)	0/144		---	(0.004)					
106	n-octylamine	111-86-4	1988	0/75		---	(0.1)	0/75		---	(0.022)									106
107	octyltin compounds		1984	0/21		---	(0.5 - 6)	0/21		---	(0.01 - 0.84)									107
108	p-octylphenol	1806-26-4	1977	0/ 6		---	(0.04 - 1.5)	2/ 6		0.004	(0.004 - 0.058)									108
109	auramine	2465-27-2	1986	0/30		---	(2)	0/30		---	(0.7)									109
110	epsilon-caprolactam	105-60-2	1977	0/ 6		---	(1 - 5)	1/ 6		1.6	(0.5 - 1)									110
			1991	0/30		---	(0.2)	0/30		---	(0.027)	1/30		0.014	(0.01)	A 7/51		120 - 330ng/m3	(100)	
111	carbazole	86-74-8	1976	0/20		---	(0.2)	0/20		---	(0.02)									111
			1994													A 0/30		--- ng/m3	(50)	
112	p-carboxy-beta-(5-nitro-2-furyl)styrene, sodium salt	54992-23-3	1983	0/30		---	(0.1 - 0.5)	0/30		---	(0.001 - 0.054)									112

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
113	ethyl formate	109-94-4	1981	0/ 9		---	(60)	0/ 9		---	(0.5)									113
114	i-butyl formate	542-55-2	1981	0/ 9		---	(45)	0/ 9		---	(0.45)									114
115	n-butyl formate	592-84-7	1981	0/ 9		---	(60)	0/ 9		---	(0.6)									115
116	methyl formate	107-31-3	1981	0/ 9		---	(35)	0/ 9		---	(0.25)									116
117	o-xylene	95-47-6	1977	0/ 3		---	(2)	0/ 3		---	(0.004)									117
			1985	1/21		0.021	(0.02)	1/21		0.0011	(0.0006)									
			1986	12/137		0.04 - 1.2	(0.03)	24/111		0.0005 - 0.007	(0.0005)	41/137		0.0008 - 0.005	(0.0008)					
			1998													A 42/42	14/14	330 - 9500ng/m3	(60)	
	m-xylene, p-xylene	108-38-3 106-42-3	1998													A 42/42	14/14	550 - 35000ng/m3	(100)	
118	m-xylene	108-38-3	1977	0/ 3		---	(2)	0/ 3		---	(0.004)									118
			1985	1/21		0.042	(0.02)	1/21		0.002	(0.001)									
			1986	15/126		0.04 - 1.2	(0.03)	33/118		0.0005 - 0.0150	(0.0005)	45/124		0.00086 - 0.0092	(0.0008)					
119	p-xylene	106-42-3	1977	0/ 3		---	(2)	0/ 3		---	(0.004)									119
			1985	1/21		0.037	(0.02)	0/21		---	(0.002)									
			1986	4/122		0.06 - 0.48	(0.03)	12/105		0.0005 - 0.0038	(0.0005)	28/127		0.0008 - 0.003	(0.0008)					
120	quinoline	91-22-5	1984	2/24		0.006	(0.005 - 3.9)	3/24		0.00005 - 0.00008	(0.00005 - 0.17)									120
			1991	0/36		---	((0.1)	2/39		0.006	(0.0051)	0/39		---	(0.003)					
121	glyoxal	107-22-2	1980	20/33		1 - 6	(1 - 2)	29/33		0.06 - 2.8	(0.005 - 0.06)									121
122	glyphosate	1071-83-6	1993	0/33		---	(0.2)	0/30		---	(0.009)	0/30		---	(0.4)					122
123	o-cresol	95-48-7	1977	0/ 9		---	(0.2 - 10)	0/ 9		---	(0.02 - 0.1)									123
124	m-cresol	108-39-4	1977	0/ 9		---	(0.2 - 10)	0/ 9		---	(0.02 - 0.1)									124
125	p-cresol	106-44-5	1977	0/ 9		---	(0.2 - 10)	3/ 9		0.02 - 0.03	(0.02 - 0.1)									125
			1996	1/33		0.67	(0.4)	9/27		0.028 - 1.23	(0.028)									
126	crotonaldehyde	4170-30-3	1987	0/75		---	(0.8)									A 0/61		--- ng/m3	(800)	126
			1995	0/33		---	(2)									A 3/54		--- ng/m3	(3600 - 5,200)	
			1997													A 1/42		$1600ng/m^3$	(1000)	
			1998													A 21/29	8/10	15 - 330ng/m3	(15)	
127	gamma-chlordene	3734-48-3	1982	0/126		---	(0.005)	27/126		0.0002 - 0.0040	(0.0002 - 0.001)	37/113		0.001 - 0.021	(0.001)					127
			1986													A 9/73		0.5 - 1.8ng/m3	(0.5)	
128	cis-chlordane	57-74-9	1982	0/126		---	(0.005)	76/126		0.0002 - 0.051	(0.0002 - 0.001)	97/123		0.001 - 0.053	(0.001)					128
			1986													A 18/73		0.43 - 5.0ng/m3	(0.4)	
129	trans-chlordane	57-74-9	1982	0/126		---	(0.005)	86/126		0.0002 - 0.075	(0.0002 - 0.001)	90/123		0.001 - 0.069	(0.001)					129
			1986													A 33/73		0.40 - 8.5ng/m3	(0.4)	

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
130	chloroacetaldehyde	107-20-0	1980	0/33		---	(1.5 - 15)	0/33		---	(0.03 - 0.3)									130
131	chloroacetone	78-95-5	1986	0/30		---	(2)	0/30		---	(0.06)									131
132	o-chloroaniline	95-51-2	1976	12/120		0.028 - 0.35	(0.02 - 100)	29/113		0.0007 - 0.098	(0.0003 - 1.0)	0/ 2		---	(1.0)					132
			1990	7/78		0.02 - 0.56	(0.02)	25/64		0.0032 - 0.028	(0.003)	2/72		0.0012 - 0.0025	(0.001)	A 0/51		--- ng/m3	(150)	
			1998	0/144	0/48	---	(0.09)	17/133	7/45	0.0051 - 0.056	(0.005)									
133	m-chloroaniline	108-42-9	1976	10/128		0.013 - 0.34	(0.04 - 100)	34/121		0.0003 - 0.067	(0.0001 - 1.2)	0/ 2		---	(1.0)					133
			1990	3/45		0.029 - 0.06	(0.02)	24/43		0.003 - 0.043	(0.003)	0/51		---	(0.002)	A 0/51		--- ng/m3	(150)	
			1998	0/153	0/51	---	(0.11)	11/130	5/44	0.0046 - 0.022	(0.0045)									
134	p-chloroaniline	106-47-8	1976	9/128		0.024 - 0.39	(0.02 - 100)	39/121		0.001 - 0.27	(0.0005 - 1.2)	0/ 2		---	(1.0)					134
			1990	0/54		---	(0.05)	15/42		0.0089 - 0.05	(0.008)	0/57		---	(0.005)	A 0/51		--- ng/m3	(250)	
			1998	0/135	0/45	---	(0.07)	24/135	9/45	0.0053 - 0.02	(0.005)									
135	o-chlorobenzoic acid	118-91-2	1985	0/33		---	(3)	0/33		---	(0.02)									135
136	1-chloroanthraquinone	82-44-0	1985	0/33		---	(1)	0/27		---	(0.05)									136
137	2-chloroanthraquinone	131-09-9	1985	0/33		---	(1)	0/27		---	(0.05)									137
138	2-chloro-4-ethylamino-6-isopropylamino-sym-triazine	1912-24-9	1991	0/57		---	(0.13)	0/51		---	(0.027)									138
139	2-chloroethyl vinyl ether	110-75-8	1984	0/24		---	(0.04 - 0.2)	0/24		---	(0.005 - 0.006)									139
140	3-chloro-1,2-epoxypropane	106-89-8	1977	0/ 3		---	(10)	0/ 3		---	(0.06)									140
			1986	0/27		---	(0.5)	0/27		---	(0.02)									
141	chlorocyclohexane	542-18-7	1977	0/ 6		---	(0.02 - 10)	0/ 6		---	(0.0001 - 2)									141
142	1-chloro-2,4-dinitrobenzene	97-00-7	1978	0/24		---	(0.2 - 0.5)	0/15		---	(0.007 - 0.0167)									142
143	3-chloro-1,2-dibromopropane	96-12-8	1982	0/27		---	(2 - 12)	0/27		---	(0.012 - 0.05)									143
			1989	0/66		---	(0.2)	0/57		---	(0.007)					A 0/36		--- ng/m3	(20)	
144	chlorodibromomethane	124-48-1	1980													A 9/63		0.0001 - 0.001ppb	(0.0001 - 0.05)	144
			1981	12/24		0.01 - 3.4	(0.01)	9/24		0.0013 - 0.0068	(0.00006)									
			1983													A 82/108		0.00008 - 0.0035ppb	(0.00003 - 0.0005)	
145	o-chlorostyrene	2039-87-4	1981	0/27		---	(10)	0/27		---	(0.2)									145
146	m-chlorostyrene	2039-85-2	1981	0/27		---	(25)	0/27		---	(0.5)									146
147	p-chlorostyrene	1073-67-2	1981	0/27		---	(5)	0/27		---	(0.1)									147
148	3-chlorotriclosan	63709-57-9	1995	0/33		---	(0.04)	3/33		0.009	(0.005)	0/33		---	(0.003)					148
149	5-chlorotriclosan	3380-44-7	1995	0/33		---	(0.06)	3/33		0.01	(0.005)	0/33		---	(0.003)					149

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
150	o-chlorotoluene	95-49-8	1979	0/18		---	(0.006 - 1)	0/18		---	(0.00012 - 0.02)									150
			1989	0/66		---	(0.3)	0/66		---	(0.011)					A 2/21		13.4 - 15ng/m3	(10)	
151	p-chlorotoluene	106-43-4	1979	0/18		---	(0.006 - 1)	0/18		---	(0.00012 - 0.02)									151
			1989	0/66		---	(0.5)	0/66		---	(0.011)					A 0/24		--- ng/m3	(30)	
152	1-chloronaphthalene	90-13-1	1977	0/ 6		---	(0.3 - 3)	0/ 6		---	(0.012 - 0.3)									152
			1986	0/33		---	(0.05)	0/30		---	(0.003)									
153	2-chloronaphthalene	91-58-7	1977	0/ 6		---	(0.3 - 3)	0/ 6		---	(0.012 - 0.3)									153
			1986	0/33		---	(0.05)	0/30		---	(0.003)									
154	4-chloro-2-nitroaniline	89-63-4	1978	0/24		---	(0.1 - 0.88)	0/15		---	(0.02 - 0.0292)									154
155	4-chloro-3-nitro-alpha,alpha,alpha-trifluorotoluene	121-17-5	1981	0/24		---	(0.2 - 1)	0/24		---	(0.002 - 0.01)									155
156	o-chloronitrobenzene	88-73-3	1975	0/95		---	(0.1)													156
			1991	0/156		---	(0.3)	0/162		---	(0.023)	0/138		---	(0.0075)	A 3/54		14 - 45ng/m3	(7)	
157	m-chloronitrobenzene	121-73-3	1975	0/95		---	(0.1)													157
			1994	0/27		---	(0.05)	0/27		---	(0.015)	0/27		---	(0.003)	A 0/27		--- ng/m3	(5)	
158	p-chloronitrobenzene	100-00-5	1978	0/24		---	(0.05 - 0.075)	0/15		---	(0.002 - 0.0025)									158
			1991	0/156		---	(0.3)	0/162		---	(0.04)	0/138		---	(0.0075)	A 5/54		3.6 - 110ng/m3	(3)	
159	2-chloro-5-nitrobenzenesulfonic acid	96-73-1	1979	0/30		---	(2 - 20)	0/30		---	(0.05 - 0.4)									159
160	chloropicrin	76-06-2	1979	0/24		---	(0.005 - 0.1)	0/24		---	(0.00025 - 0.005)									160
			1994	0/45		---	(0.2)									A 0/51		--- ng/m3	(5000)	
161	2-chloro-4,6-bis(ethylamino)-sym-triazine	122-34-9	1980	0/18		---	(2)	0/18		---	(0.1)									161
			1991	0/57		---	(0.2)	0/54		---	(0.048)									
162	2-chloropyridine	109-09-1	1980	0/21		---	(2 - 20)	0/21		---	(0.01 - 0.2)									162
163	o-chlorophenol	95-57-8	1978	0/24		---	(0.2 - 40)	0/24		---	(0.1 - 4)									163
			1996	0/33		---	(0.05)	0/33		---	(0.009)									
164	m-chlorophenol	108-43-0	1978	0/24		---	(2 - 40)	0/24		---	(0.05 - 4)									164
			1996	0/33		---	(0.05)	0/33		---	(0.0095)									
165	p-chlorophenol	106-48-9	1978	0/24		---	(2 - 40)	0/24		---	(0.05 - 4)									165
			1996	0/33		---	(0.05)	0/33		---	(0.009)									
166	1-chlorobutane	109-69-3	1997	0/36		---	(0.01)	0/36		---	(0.028)					A 2/57		210 - 290ng/m3	(200)	166
			1998													A 19/37	9/13	38 - 1400ng/m3	(37)	

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
167	chloroprene	126-99-8	1977	0/ 6		---	(2)													167
168	1-chloropropane	540-54-5	1981	0/27		---	(0.2 - 8)	0/27		---	(0.001 - 0.004)									168
169	2-chloropropane	75-29-6	1981	0/27		---	(0.2 - 8)	0/27		---	(0.001 - 0.004)									169
170	S-4-chlorobenzyl-N,N-diethylthiocarbamate	28249-77-6	1992	0/165		---	(0.2)	3/165		0.062 - 0.1	(0.044)	0/150		---	(0.014)	A 1/46		8.4ng/m^3	(3)	170
171	o-chlorobenzaldehyde	89-98-5	1984	0/27		---	(0.2 - 1)	0/27		---	(0.003 - 0.023)									171
172	m-chlorobenzaldehyde	587-04-2	1984	0/27		---	(0.4 - 1)	0/27		---	(0.01 - 0.03)									172
173	p-chlorobenzaldehyde	104-88-1	1984	0/27		---	(0.2 - 1)	0/27		---	(0.005 - 0.03)									173
174	chlorobenzene	108-90-7	1976	0/68		---	(40 - 200)	0/61		---	(0.4 - 4)	0/ 2		---	(1.0)					174
			1983													A 91/91		0.001 - 0.022ppb	(0.001)	
			1997	0/36		---	(0.3)	0/36		---	(0.019)									
			1998													A 24/32	10/11	20 - 160ng/m3	(20)	
175	chloropentabromocyclohexane	87-84-3	1985	0/27		---	(0.03)	0/27		---	(0.004)									175
176	2-chloro-6-methylaniline	87-63-8	1981	0/18		---	(0.015 - 7.5)	0/18		---	(0.0005 - 0.5)									176
177	3-chloro-4-methylaniline	95-74-9	1981	0/18		---	(0.03 - 15)	0/18		---	(0.0001 - 1.0)									177
178	4-chloro-2-methylaniline	95-69-2	1981	0/18		---	(0.03 - 15)	0/18		---	(0.0001 - 1.0)									178
179	2-chloro-5-methylphenol	615-74-7	1984	0/24		---	(0.025 - 0.1)	0/24		---	(0.0015 - 0.003)									179
180	2-chloro-6-methylphenol	87-64-9	1984	0/24		---	(0.015 - 0.09)	0/24		---	(0.001 - 0.002)									180
181	4-chloro-2-methylphenol	1570-64-5	1984	0/24		---	(0.020 - 0.09)	0/24		---	(0.001 - 0.002)									181
182	4-chloro-3-methylphenol	59-50-7	1984	0/24		---	(0.025 - 0.1)	0/24		---	(0.0015 - 0.003)									182
183	1-chloro-2-methylpropene	513-37-1	1980	0/36		---	(1 - 20)	0/36		---	(0.0001 - 0.1)									183
184	3-chloro-2-methylpropene	563-47-3	1980	0/30		---	(1 - 20)	0/30		---	(0.0001 - 0.1)									184
185	ethyl acetate	141-78-6	1995													A 18/18		99 - 11,800ng/m3	(2)	185
186	2-ethoxyethyl acetate	111-15-9	1986	0/30		---	(0.5)	0/30		---	(0.09)									186
			1995	0/33		---	(0.05)	0/33		---	(0.0036)									
187	vinyl acetate	108-05-4	1995	0/33		---	(5)									A 4/18		55 - 5,000ng/m3	(50)	187
188	butyl acetate	123-86-4	1995	0/33		---	(0.2)									A 18/18		8.1 - 2,100ng/m3	(2)	188
189	2-methoxyethyl acetate	110-49-6	1986	0/30		---	(0.7)	0/30		---	(0.2)									189

Surveyed Chemical Substances and their Detected Levels in the Environment
(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
190	methoxybutyl acetate	4435-53-4	1980	0/27		---	(2.5 - 10)	0/27		---	(0.025 - 0.8)									190
			1995	0/33		---	(0.2)													
191	salithion	3811-48-2	1993													A 0/27		--- ng/m3	(2)	191
192	o-dianisidine	119-90-4	1977	0/ 6		---	(0.05)	0/ 3		---	(0.003)									192
193	2-cyanopyridine	100-70-9	1984	0/24		---	(1 - 4)	0/24		---	(0.06 - 0.2)									193
194	3-cyanopyridine	100-54-9	1984	0/24		---	(1 - 4)	0/24		---	(0.05 - 0.2)									194
195	4-cyanopyridine	100-48-1	1984	0/24		---	(0.9 - 4)	0/24		---	(0.04 - 0.2)									195
196	1,4-diaminoanthraquinone	128-95-0	1986	0/30		---	(0.3)	0/30		---	(0.2)									196
197	1,2-diaminoethane	107-15-3	1987	0/87		---	(0.4)	1/84		0.087	(0.078)									197
198	4,4'-methylenebisbenzeneamine	101-77-9	1985	0/30		---	(5)	0/24		---	(1)									198
199	1,2-diaminopropane	78-90-0	1987	0/87		---	(0.6)	0/87		---	(0.100)									199
200	1,3-diaminopropane	109-76-2	1987	0/87		---	(0.4)	0/87		---	(0.19)									200
201	1,6-diaminohexane	124-09-4	1987	0/87		---	(2)	0/87		---	(0.46)									201
202	diallylamine	124-02-7	1981	0/27		---	(0.8 - 2)	0/27		---	(0.005 - 0.01)									202
203	diisobutylene	107-40-4	1978	0/12		---	(0.16 - 0.3)	0/12		---	(0.00031 - 0.00078)									203
204	diisopropylidene acetone	504-20-1	1981	0/36		---	(0.02 - 10)	0/36		---	(0.0008 - 0.2)									204
205	diisopropylamine	108-18-9	1981	0/27		---	(2)	0/27		---	(0.005 - 0.02)									205
206	diisopropyl-1,3-dithiolan-2-ylidenemalonate	50512-35-1	1992	26/78		0.05 - 0.27	(0.045)	8/78		0.011 - 0.034	(0.01)	6/75		0.0094 - 0.15	(0.0064)	A 0/52		--- ng/m3	(15)	206
207	diisopropylnaphthalene	38640-62-9	1975	0/100		---	(0.17 - 0.5)	9/100		0.061 - 0.19	(0.03 - 0.25)	2/94		0.028 - 0.048	(0.025 - 0.25)					207
			1977	0/117		---	(0.01 - 10)	6/117		0.0019 - 0.1	(0.0011 - 0.6)	7/93		0.00052 - 0.0017	(0.0002 - 0.5)					
			1980	0/120		---	(0.01 - 20)	3/120		0.049 - 0.064	(0.01 - 1.0)	3/108		0.006 - 0.025	(0.002 - 2.5)					
208	m-diisopropylbenzene	99-62-7	1977	0/ 3		---	(4)	0/ 3		---	(0.01)									208
209	p-diisopropylbenzene	100-18-5	1977	0/ 3		---	(4)	0/ 3		---	(0.01)									209
210	diethanolamine	111-42-2	1978	0/12		---	(0.3 - 3.4)													210
211	N,N-diethylaniline	91-66-7	1977	0/ 6		---	(1 - 5)	0/ 6		---	(0.25 - 1)									211
212	diethylamine	109-89-7	1981	0/27		---	(0.6 - 4)	0/27		---	(0.006 - 0.01)									212
213	diethylbiphenyl	28575-17-9	1976	0/68		---	(0.8 - 20)	0/50		---	(0.2 - 2.0)	0/20		---	(0.16 - 0.5)					213

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection: Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				#
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
214	tetrachlorocarbon	56-23-5	1974	0/60		---	(0.02 - 0.5)									R 2/18		0.0102 - 0.0105ppm	(0.00002 - 0.0005)	214
			1975	105/ 355		0.02 - 1.3	(0.01 - 0.3)									R 17/108		0.000022 - 0.0036ppm	(0.00002 - 0.0003)	
			1979													A 42/45		0.04 - 0.79ppb	(0.006 - 3)	
			1980													A 122/131		0.022 - 0.76ppb	(0.001 - 0.03)	
			1983													A 108/108		0.019 - 0.95ppb	(0.0025 - 0.030)	
215	dioxane	123-91-1	1976	0/60		---	(100)	0/20		---	(0.4)									215
216	dioctyltin compounds		1984	0/21		---	(0.5 - 1)	0/21		---	(0.03 - 0.14)									216
217	cyclohexanone	108-94-1	1980	0/24		---	(4 - 50)	0/24		---	(0.2 - 1.0)									217
218	cyclohexane	110-82-7	1979	0/27		---	(0.05 - 0.2)	0/27		---	(0.0001 - 0.0004)									218
219	cyclohexylamine	108-91-8	1982	8/15		0.06 - 0.18	(0.06 - 0.5)	6/15		0.005 - 0.020	(0.004 - 0.005)									219
			1983	2/126		0.9 - 1.1	(0.3 - 2)	3/126		0.032 - 0.041	(0.01 - 0.08)	3/123		0.090 - 0.11	(0.015 - 0.1)					
220	N-cyclohexyl-2-benzothiazolesulfenamide	95-33-0	1977	0/12		---	(0.02 - 0.08)	0/12		---	(0.0023 - 0.02)									220
			1998	0/36	0/12	---	(0.21)	0/39	0/13	---	(0.01)									
221	cyclopentadiene	542-92-7	1980	3/24		0.4 - 0.8	(0.1 - 0.2)	0/24		---	(0.0004 - 0.0022)									221
222	cyclopentane	287-92-3	1980	7/24		0.1 - 0.8	(0.1 - 0.2)	3/24		0.0007 - 0.003	(0.0004 - 0.0024)									222
223	2,3-dichloroaniline	608-27-5	1984	0/18		---	(0.01 - 0.1)	0/18		---	(0.0001 - 0.012)									223
224	2,4-dichloroaniline	554-00-7	1976	7/68		0.032 - 0.53	(0.02 - 0.3)	12/68		0.0005 - 0.034	(0.0005 - 0.001)									224
			1998	0/39	0/13	---	(0.07)	0/36	0/12	---	(0.008)									
225	2,5-dichloroaniline	95-82-9	1984	0/18		---	(0.05 - 0.1)	1/18		0.0006	(0.0006 - 0.012)									225
			1998	0/39	0/13	---	(0.07)	1/36	1/12	0.01	(0.005)									
226	2,6-dichloroaniline	608-31-1	1984	0/18		---	(0.1 - 1)	0/18		---	(0.0098 - 0.012)									226
227	3,4-dichloroaniline	95-76-1	1976	4/68		0.24 - 0.42	(0.04 - 0.3)	31/68		0.0045 - 0.11	(0.0008 - 0.003)									227
			1984	0/18		---	(0.03 - 0.1)	1/18		0.0016	(0.0003 - 0.012)									
			1998	0/39	0/13	---	(0.09)	4/39	2/13	0.012 - 0.015	(0.01)									
228	3,5-dichloroaniline	626-43-7	1984	0/18		---	(0.02 - 0.1)	0/18		---	(0.0002 - 0.012)									228

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection: Water(ng/ml) A/B	C/D	Range of detection	Limit of detection	Sediment(ug/g-dry) A/B	C/D	Range of detection	Limit of detection	Fishes(ug/g-wet) A/B	C/D	Range of detection	Limit of detection	Others A:Air; R:Rain Water; P:Plankton A/B	C/D	Range of detection	Limit of detection	#
229	1,1-dichloroethane	75-34-3	1977	0/ 3		---	(0.05)	0/ 3		---	(0.0003)									229
			1979													A 0/36		--- ppb	(0.2 - 10)	
			1987	11/66		0.005 - 0.030	(0.005)	4/60		0.00011 - 0.00027	(0.00011)					A 6/73		17 - 90ng/m3	(10)	
			1988	36/129		0.005 - 16	(0.005)	4/117		0.00014 - 0.00048	(0.0001)									
230	1,2-dichloroethane	107-06-2	1976	0/60		---	(40 - 200)	0/40		---	(1.0 - 3.4)	0/10		---	(8.7)					230
			1979													A 6/45		0.06 - 10ppb	(0.003 - 10)	
			1980													A 18/81		0.013 - 0.89ppb	(0.013 - 7)	
			1987	30/78		0.03 - 2.5	(0.02)	6/63		0.00052 - 0.00065	(0.0005)					A 60/73		10 - 6,600ng/m3	(10)	
			1988	66/141		0.02 - 3.4	(0.02)	5/126		0.00062 - 0.0028	(0.0005)					A 39/68		45 - 2,200ng/m3	(40)	
231	1,1-dichloroethylene	75-35-4	1979	0/21		---	(0.028 - 0.3)	0/21		---	(0.0003 - 0.002)									231
232	cis-1,2-dichloroethylene	156-59-2	1977	0/ 3		---	(0.06)	0/ 3		---	(0.0003)									232
			1987	24/66		0.005 - 0.54	(0.005)	1/69		0.00033	(0.0002)					A 19/73		10 - 160ng/m3*	(10)	
233	trans-1,2-dichloroethylene	156-60-5	1977	0/ 3		---	(0.03)	0/ 3		---	(0.0002)									233
			1987	6/78		0.077 - 0.23	(0.01)	3/78		0.0013 - 0.0079	(0.00026)					A 19/73		10 - 160ng/m3*	(10)	
*The values are the Total of cis- and trans-1,2-dichloroethylene for the air samples																				
234	dichloroacetic acid	79-43-6	1984	0/21		---	(2)	0/21		---	(0.01 - 0.02)									234
235	3,3'-dichloro-4,4'-diaminodiphenyl methane	101-14-4	1979	0/39		---	(0.02 - 200)	0/39		---	(0.001 - 3.0)									235
			1985	0/30		---	(5)	0/24		---	(0.4)									
236	p,p'-dichlorodiphenyldichloroethylene	72-55-9	1974	0/55		---	(0.0003 - 0.1)	22/50		0.0001 - 0.0079	(0.01)	43/49		0.0006 - 0.131	(0.0002 - 0.005)					236
237	p,p'-dichlorodiphenyldichloroethane	72-54-8	1974	0/55		---	(0.0007 - 0.1)	20/55		0.010 - 0.0150	(0.01)	25/49		0.0008 - 0.015	(0.0008 - 0.005)					237
238	o,p'-dichlorodiphenyltrichloroethane	789-02-6	1974	0/55		---	(0.0007 - 0.1)	0/50		---	(0.0003 - 0.01)	6/49		0.0016 - 0.0021	(0.0005 - 0.005)					238
239	p,p'-dichlorodiphenyltrichloroethane	50-29-3	1974	0/55		---	(0.002 - 0.1)	20/50		0.0008 - 0.0073	(0.01)	7/49		0.0009 - 0.0013	(0.0005 - 0.005)					239
240	dichlorodifluoromethane	75-71-8	1976													A 45/115		0.31 - 33ppb	(0.25 - 1)	240
			1977													A 38/97		0.043 - 0.73ppb	(0.019 - 2)	
241	3,5-dichlorotriclosan	53555-01-4	1995	0/33		---	(0.05)	1/33		0.008	(0.0056)	1/33		0.018	(0.0089)					241

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection: Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				#
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
242	2,4-dichlorotoluene	95-73-8	1981	0/21		---	(6 - 60)	0/21		---	(0.15)									242
			1997	0/36		---	(0.4)	0/33		---	(0.0093)									
243	2,6-dichlorotoluene	118-69-4	1981	0/21		---	(8 - 80)	0/21		---	(0.2)									243
244	3,4-dichlorotoluene	95-75-0	1981	0/21		---	(10 - 100)	0/21		---	(0.25)									244
245	2,3-dichloro-1,4-naphthoquinone	117-80-6	1982	0/24		---	(0.08 - 0.15)	0/24		---	(0.006 - 0.033)									245
246	2,3-dichloronitrobenzene	3209-22-1	1981	0/21		---	(0.03)	0/21		---	(0.0015)									246
247	2,4-dichloronitrobenzene	611-06-3	1981	0/21		---	(0.02)	0/21		---	(0.001)									247
			1994	0/27		---	(0.06)	0/27		---	(0.0085)	0/27		---	(0.003)	A 0/27		--- ng/m3	(14)	
248	2,5-dichloronitrobenzene	89-61-2	1981	0/21		---	(0.02)	0/21		---	(0.001)									248
			1994	0/27		---	(0.05)	0/27		---	(0.012)	0/27		---	(0.003)	A 0/27		--- ng/m3	(11)	
249	3,4-dichloronitrobenzene	99-54-7	1981	0/21		---	(0.02)	0/21		---	(0.001)									249
250	3,5-dichloronitrobenzene	618-62-2	1981	0/21		---	(0.006)	0/21		---	(0.0003)									250
251	2,4-dichlorophenyl-4'-nitrophenyl ether	1836-75-5	1982	3/54		0.005 - 0.027	(0.001 - 0.2)	0/54		---	(0.0001 - 0.009)									251
252	N-(3,4-dichlorophenyl)propanamide	709-98-8	1980	0/30		---	(0.1 - 10)	0/30		---	(0.005 - 0.1)									252
253	2,4-dichlorophenyl-3'-methoxy-4'-nitrophenyl ether	32861-85-1	1982	5/54		0.002 - 0.003	(0.001 - 0.2)	0/54		---	(0.0002 - 0.03)									253
			1991	0/57		---	(0.3)	0/54		---	(0.067)					A 0/54		--- ng/m3	(40)	
254	2,4-dichlorophenoxyacetic acid	94-75-7	1983	0/45		---	(0.05 - 1)	0/45		---	(0.001 - 0.076)									254
			1996	0/33		---	(0.2)	0/33		---	(0.022)									
255	2,3-dichlorophenol	576-24-9	1978	0/24		---	(0.2 - 40)	0/24		---	(0.005 - 4)									255
			1996	0/33		---	(0.07)	0/33		---	(0.011)					A 0/18		--- ng/m3	(10)	
256	2,4-dichlorophenol	120-83-2	1978	0/24		---	(0.2 - 40)	0/24		---	(0.005 - 4)									256
			1996	0/33		---	(0.07)	0/33		---	(0.011)					A 0/18		--- ng/m3	(10)	
257	2,5-dichlorophenol	583-78-8	1978	0/24		---	(0.2 - 40)	0/24		---	(0.005 - 4)									257
			1996	0/33		---	(0.07)	0/33		---	(0.011)					A 0/18		--- ng/m3	(10)	
258	2,6-dichlorophenol	87-65-0	1978	0/24		---	(0.2 - 40)	0/24		---	(0.005 - 4)									258
			1996	0/33		---	(0.07)	0/33		---	(0.011)					A 0/18		--- ng/m3	(10)	
259	3,4-dichlorophenol	95-77-2	1978	0/24		---	(1 - 40)	0/24		---	(0.03 - 4)									259
			1996	0/33		---	(0.07)	0/33		---	(0.011)					A 0/18		--- ng/m3	(10)	
260	3,5-dichlorophenol	591-35-5	1978	0/24		---	(1 - 40)	0/24		---	(0.03 - 4)									260
			1996	0/33		---	(0.07)	0/33		---	(0.011)					A 0/18		--- ng/m3	(10)	

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection: Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				#
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
261	3,4-dichloro-1-butene	760-23-6	1997	0/36		---	(0.011)	0/36		---	(0.014)					A 0/57		--- ng/m3	(60)	261
			1998													A 1/36	1/12	80ng/m^3	(60)	
262	1,3-dichloro-2-propanol	96-23-1	1987	3/87		3.1 - 4.0	(1)	0/81		---	(0.09)	0/87		---	(0.02)	A 0/73		--- ng/m3	(40)	262
			1995	0/33		---	(2)	0/33		---	(0.2)					A 1/18		5ng/m^3	(5)	
263	2,3-dichloro-1-propanol	616-23-9	1987	0/87		---	(2)	0/81		---	(0.09)	0/87		---	(0.03)	A 0/73		--- ng/m3	(40)	263
264	1,2-dichloropropane	78-87-5	1976	0/60		---	(40 - 300)	0/40		---	(1.0 - 3.4)	0/10		---	(8.7)					264
265	2,2-dichloropropanoic acid	127-20-8	1980	0/24		---	(10 - 50)	0/24		---	(0.5 - 0.68)									265
			1984	2/21		1	(0.5 - 10)	0/21		---	(0.01 - 0.06)									
266	1,3-dichloropropene	542-75-6	1984	0/21		---	(0.5 - 4)	0/21		---	(0.002 - 0.07)									266
267	2,3-dichloro-1-propene	78-88-6	1988	0/66		---	(0.5)	0/66		---	(0.0042)					A 0/72		--- ng/m3	(200)	267
268	dichlorobromomethane	75-27-4	1980													A 9/81		0.0001 - 0.0019ppb	(0.0001 - 0.05)	268
			1981	1/15		0.01	(0.01)	0/15		---	(0.00006)									
			1983													A 83/93		0.00005 - 0.013ppb	(0.00004 - 0.0005)	
269	3,3-dichloro-(1,1'-biphenyl)-4,4'-diamine	91-94-1	1979	0/21		---	(0.01 - 7)	0/21		---	(0.0003 - 0.9)									269
270	ethyl-p,p'-dichlorobenzilate	510-15-6	1987	0/75		---	(1)	0/66		---	(0.06)	0/75		---	(0.03)					270
271	o-dichloricide	95-50-1	1975	0/95		---	(0.3 - 3)	0/95		---	(0.02 - 0.5)	0/75		---	(0.05 - 0.5)	R 0/24		---	(0.0003 - 0.003)	271
			1983													A 93/97		0.001 - 0.050ppb	(0.001)	
272	m-dichloricide	541-73-1	1975	0/95		---	(0.1 - 2)	3/95		0.01 - 0.05	(0.01 - 0.5)	0/75		---	(0.02 - 0.5)	R 0/24		---	(0.0001 - 0.002)	272
			1983													A 24/95		0.001 - 0.0098ppb	(0.001)	
273	p-dichloricide	106-46-7	1975	2/95		0.5 - 1	(0.3 - 3)	1/95		0.03	(0.02 - 0.5)	0/75		---	(0.05 - 0.5)	R 0/24		---	(0.0003 - 0.003)	273
			1983													A 95/95		0.0021 - 0.88ppb	(0.001)	
274	dichloromethane	75-09-2	1979													A 25/46		0.07 - 1.5ppb	(0.006 - 10)	274
			1980													A 47/135		0.026 - 0.8ppb	(0.005 - 8)	
			1983													A 99/101		0.002 - 5.6ppb	(0.001 - 0.01)	
			1998													A 42/42	14/14	280 - 24000ng/m3	(70)	
275	N,N-dicyclohexyl-2-benzothiazolesulfene amide	4979-32-2	1998	0/39	0/13	---	(0.3)	0/39	0/13	---	(0.01)									275

Surveyed Chemical Substances and their Detected Levels in the Environment
(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
276	dicyclopentadiene	77-73-6	1978	0/12		---	(0.016 - 0.2)	3/12		0.00087 - 0.00093	(0.000042 - 0.0003)									276
			1989	0/66		---	(0.1)	0/57		---	(0.005)									
277	S-[alpha-(ethoxycarbonyl)benzyl] O,O-dimethyl phosphorodithioate	2597-03-7	1988	0/72		---	(0.1)	0/72		---	(0.051)	0/72		---	(0.003)	A 0/72		--- ng/m3	(20)	277
278	2,4-dinitroaniline	97-02-9	1990	0/75		---	(1.7)	1/75		0.56	(0.19)	0/72		---	(0.078)					278
279	2,6-dinitro-p-cresol	609-93-8	1994	0/36		---	(0.2)	0/36		---	(0.015)	0/36		---	(0.005)					279
280	2,4-dinitrotoluene	121-14-2	1976	0/70		---	(0.08 - 0.1)	0/50		---	(0.00035 - 0.01)	0/10		---	(0.006)					280
			1991	0/48		---	(0.14)	0/48		---	(0.0099)	0/45		---	(0.005)					
281	2,6-dinitrotoluene	606-20-2	1976	1/70		0.054	(0.025 - 0.03)	3/55		0.003 - 0.0050	(0.0007 - 0.01)	0/10		---	(0.002)					281
			1991	0/48		---	(0.11)	0/48		---	(0.011)	0/45		---	(0.005)					
282	3,4-dinitrotoluene	610-39-9	1976	0/70		---	(0.05 - 0.075)	0/95		---	(0.002 - 0.01)	0/10		---	(0.004)					282
283	1,5-dinitronaphthalene	605-71-0	1985	0/30		---	(0.05)	0/30		---	(0.004)									283
284	1,8-dinitronaphthalene	602-38-0	1985	0/30		---	(0.05)	0/30		---	(0.004)									284
285	1,3-dinitropyrene	75321-20-9	1990	0/69		---	(0.04)	0/72		---	(0.13)	0/69		---	(0.075)					285
286	1,6-dinitropyrene	42397-64-8	1990	0/69		---	(0.04)	0/72		---	(0.15)	0/69		---	(0.075)					286
287	1,8-dinitropyrene	42397-65-9	1990	0/69		---	(0.04)	0/72		---	(0.15)	0/69		---	(0.08)	A 0/48		--- ng/m3	(0.01)	287
288	2,4-dinitrophenol	51-28-5	1984	0/21		---	(0.04 - 0.2)	0/21		---	(0.004 - 0.041)									288
			1994	0/36		---	(0.4)	0/36		---	(0.0076)	0/36		---	(0.01)					
289	o-dinitrobenzene	528-29-0	1976	0/70		---	(0.05)	1/54		0.0008	(0.0002 - 0.01)	0/10		---	(0.004)					289
			1991	0/45		---	(0.1)	0/48		---	(0.013)									
290	m-dinitrobenzene	99-65-0	1976	0/70		---	(0.1 - 0.25)	1/51		0.08	(0.007 - 0.02)	0/10		---	(0.01)					290
			1991	0/45		---	(0.1)	0/48		---	(0.012)	0/48		---	(0.005)					
291	p-dinitrobenzene	100-25-4	1994	0/27		---	(0.054)	0/27		---	(0.014)	0/27		---	(0.003)					291
292	4,6-dinitro-2-methylphenol	534-52-1	1984	0/21		---	(0.016 - 0.08)	0/21		---	(0.0016 - 0.017)									292
293	2,3-dihydro-2,2-dimethylbenzofuran-7-yl methylcarbamate	1563-66-2	1992	0/72		---	(0.1)	0/72		---	(0.04)	0/69		---	(0.02)					293
294	diphenylamine	122-39-4	1976	0/80		---	(0.6 - 5)	0/20		---	(0.20 - 0.74)	0/20		---	(0.15 - 0.25)					294
			1990	3/81		0.4 - 1.2	(0.2)	12/63		0.0063 - 0.2	(0.005)	2/72		0.03	(0.02)					
295	diphenyl ether	101-84-8	1976	0/88		---	(0.6 - 5)	0/28		---	(0.1 - 0.74)	0/20		---	(0.15 - 0.25)					295
			1984	0/24		---	(0.02 - 0.08)	0/24		---	(0.0006 - 0.003)									
296	diphenylguanidine	102-06-7	1978	0/42		---	(2 - 50)	0/42		---	(0.1 - 0.5)									296
297	diphenyl disulfide	882-33-7	1983	0/30		---	(0.1)	0/30		---	(0.005 - 0.024)									297

Surveyed Chemical Substances and their Detected Levels in the Environment
(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
298	diphenyltin compounds		1989	5/72		0.38 - 27	(0.06)	31/53		0.007 - 0.5	(0.005)	48/59		0.005 - 0.99	(0.005)					298
			1998	12/133	6/45	0.00037 - 0.0017	(0.0003)	79/138	30/46	0.00079 - 0.21	(0.00072)									
299	1,1-diphenylhydrazine	530-50-7	1982	0/ 9		---	(10)	0/ 9		---	(0.3)									299
300	N,N'-diphenylhydrazine	122-66-7	1986	0/30		---	(0.6)	0/30		---	(0.3)									300
301	diphenylmethane	101-81-5	1983	0/33		---	(0.03 - 0.4)	3/33		0.059 - 0.16	(0.004 - 0.041)									301
			1984	2/138		0.6 - 1.1	(0.008 - 0.5)	10/138		0.0006 - 0.0019	(0.0004 - 0.044)	3/138		0.0019 - 0.0049	(0.0001 - 0.008)					
302	di-n-butylamine	111-92-2	1986	0/30		---	(2)	0/30		---	(0.05)									302
303	2,6-di-t-butyl-4-ethylphenol	4130-42-1	1984	0/30		---	(0.06 - 0.3)	2/30		0.0036 - 0.0048	(0.0006 - 0.0071)									303
304	dibutyltin compounds		1983	0/75		---	(0.1 - 0.4)	3/75		0.02 - 0.03	(0.01 - 0.044)									304
			1984	0/138		---	(0.08 - 10)	6/138		0.004 - 0.11	(0.003 - 0.07)	0/138		---	(0.003 - 0.05)					
			1998	20/39	8/13	0.003 - 0.017	(0.0021)	36/36	12/12	0.002 - 0.27	(0.002)									
305	2,5-di-t-butylhydroquinone	88-58-4	1980	0/39		---	(0.3 - 10)	0/39		---	(0.027 - 0.2)									305
306	2,6-di-t-butylphenol	128-39-2	1996	0/33		---	(0.3)	0/33		---	(0.071)	0/33		---	(0.04)					306
307	2,6-di-t-butyl-4-methylphenol	128-37-0	1976	0/68		---	(0.4 - 5)	10/68		0.066 - 1.69	(0.01 - 0.04)									307
			1977	0/117		---	(0.1 - 5)	17/117		0.008 - 0.22	(0.008 - 0.06)	7/85		0.006 - 0.069	(0.004 - 0.12)					
			1985													A 29/60		1.2 - 20ng/m3	(1.0 - 5)	
			1996	0/33		---	(0.3)	1/33		0.103	(0.09)	0/33		---	(0.058)	A 5/18		37 - 70ng/m3	(32)	
308	1,2-dibromoethane	106-93-4	1976	0/60		---	(0.2 - 75)	0/40		---	(0.005 - 0.17)	0/20		---	(0.005)					308
			1982	0/27		---	(0.3 - 2)	0/27		---	(0.0016 - 0.01)									
			1983													A 71/108		0.001 - 0.067ppb	(0.0003 - 0.001)	
			1997													A 0/57		--- ng/m3	(90)	
			1998													A 0/39	0/13	--- ng/m3	(71)	
309	1,2-dibromoethylene	540-49-8	1981	0/15		---	(0.5 - 3)	0/15		---	(0.003 - 0.02)									309
310	dibromocresyl glycidyl ether	30171-80-3	1977	0/15		---	(0.05 - 0.25)	0/15		---	(0.006 - 0.02)									310
311	4,4'-dibromodiphenyl	96-86-4	1997	0/156		---	(0.031)	0/147		---	(0.003)	0/156		---	(0.01)					311
312	o-dibromobenzene	583-53-9	1981	0/18		---	(0.01 - 0.05)	0/18		---	(0.0002 - 0.0005)									312
313	m-dibromobenzene	108-36-1	1981	0/18		---	(0.02 - 0.05)	0/18		---	(0.0005)									313
314	p-dibromobenzene	106-37-6	1981	0/18		---	(0.04 - 0.1)	0/18		---	(0.001)									314
315	dibromomethane	74-95-3	1981	0/15		---	(0.06)	0/15		---	(0.0003)									315
316	dibenzyl ether	103-50-4	1984	3/21		0.005 - 0.007	(0.005 - 0.03)	9/21		0.0006 - 0.0057	(0.0005 - 0.0066)									316
317	dibenzyltoluene	26898-17-9	1977	0/15		---	(10 - 40)	0/15		---	(0.5 - 4)									317

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
318	dibenz[a,h]anthracene	53-70-3	1989	1/75		0.1	(0.1)	55/60		0.0081 - 0.34	(0.006)	1/63		0.003	(0.003)	A 7/39		0.89 - 4.6ng/m3	(0.6)	318
319	p-dibenzoylquinone dioxime	120-52-5	1980	0/36		---	(0.1 - 10)													319
320	2,2'-dibenzothiazyl disulfide	120-78-5	1977	0/12		---	(0.5)	0/12		---	(0.05 - 0.17)									320
321	dibenzothiophene	132-65-0	1983	0/45		---	(0.05 - 0.1)	6/45		0.001 - 0.005	(0.001 - 0.007)									321
			1998	0/42	0/14	---	(0.02)	28/39	10/13	0.0022 - 0.14	(0.0021)	15/39	5/13	0.00071 - 0.013	(0.00034)					
322	dibenzofuran	132-64-9	1983	0/45		---	(0.2 - 0.4)	0/45		---	(0.006 - 0.027)									322
323	dipentamethylenethiuram tetrasulfide	120-54-7	1980	0/21		---	(0.002 - 0.07)	0/ 9		---	(0.2)									323
324	2,3-dimethylaniline	87-59-2	1976	0/68		---	(0.1 - 1)	6/68		0.006 - 0.090	(0.001 - 0.006)									324
			1990	0/54		---	(0.02)	0/54		---	(0.011)	0/27		---	(0.005)	A 0/51		--- ng/m3	(500)	
325	2,4-dimethylaniline	95-68-1	1977	0/ 6		---	(1 - 5)	0/ 6		---	(0.25 - 1)									325
326	2,5-dimethylaniline	95-78-3	1976	0/68		---	(0.2 - 0.5)	2/68		0.006 - 0.027	(0.001 - 0.004)									326
327	3,4-dimethylaniline	95-64-7	1976	0/68		---	(0.06 - 0.7)	8/68		0.001 - 0.043	(0.001 - 0.004)									327
			1977	0/ 6		---	(1 - 20)	0/ 6		---	(0.25 - 4)									
328	3,5-dimethylaniline	108-69-0	1976	1/68		0.04	(0.02 - 0.2)	5/68		0.002 - 0.01	(0.0005 - 0.001)									328
329	N,N-dimethylaniline	121-69-7	1976	2/68		1.1 - 1.7	(0.3 - 2.4)	6/68		0.011 - 0.21	(0.006 - 0.05)									329
			1990	0/69		---	(0.03)	3/63		0.014 - 0.027	(0.01)	0/69		---	(0.002)	A 1/36		380ng/m^3	(100)	
330	4-dimethylaminoazobenzene	60-11-7	1986	0/30		---	(0.3)	0/30		---	(0.04)									330
331	dimethylamine	124-40-3	1986	0/33		---	(4)	9/27		0.05 - 0.227	(0.05)									331
			1991													A 0/48		--- ng/m3	(640)	
332	dimethylsulfoxide	67-68-5	1992	17/45		0.2 - 4.2	(0.2)	17/42		0.005 - 0.098	(0.005)	8/39		0.0056 - 0.028	(0.005)					332
333	1,2-dimethylnaphthalene	573-98-8	1984	3/18		0.01	(0.005 - 0.3)	1/18		0.001	(0.0003 - 0.016)									333
			1985	0/141		---	(0.2)	5/138		0.038 - 0.16	(0.03)	4/129		0.002 - 0.007	(0.002)					
			1998													A 28/30	10/10	0.37 - 9.9ng/m3	(0.3)	
334	1,3-,1,6-dimethylnaphthalene	575-41-7 575-43-9	1998													A 26/27	9/9	2 - 70ng/m3	(0.56)	334
335	1,3-dimethylnaphthalene	575-41-7	1984	3/18		0.07 - 0.08	(0.01 - 0.2)	10/18		0.011 - 0.073	(0.0008 - 0.012)									335
			1985	0/141		---	(0.2)	24/142		0.03 - 0.61	(0.03)	39/129		0.0020 - 0.059	(0.002)					

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
	1,4-, 1,5-, 2,3-dimethylnaphthalene *	571-58-4 571-61-9 581-40-8	1984	3/18		0.02 - 0.03	(0.005 - 0.3)	6/18		0.004 - 0.033	(0.0003 - 0.016)									
			1985	0/147		---	(0.2)	13/147		0.03 - 0.29	(0.03)	19/129		0.002 - 0.019	(0.002)					
*The values are the total of the three compounds																				
336	1,4-dimethylnaphthalene	571-58-4	1998													A 29/30	10/10	0.27 - 7.2ng/m3	(0.23)	336
337	1,5-dimethylnaphthalene	571-61-9	1998													A 28/30	10/10	0.4 - 8.9ng/m3	(0.33)	337
338	1,7-dimethylnaphthalene	575-37-1	1998													A 27/27	9/9	0.13 - 23ng/m3	(0.1)	338
339	1,8-dimethylnaphthalene	569-41-5	1985	0/147		---	(0.2)	1/135		0.072	(0.03)	0/126		---	(0.002)					339
			1998													A 21/21	7/7	0.09 - 5.1ng/m3	(0.08)	
340	2,3-dimethylnaphthalene	581-40-8	1998													A 28/30	10/10	0.4 - 13ng/m3	(0.4)	340
341	2,6-dimethylnaphthalene	581-42-0	1984	3/18		0.02	(0.006 - 0.2)	10/18		0.006 - 0.067	(0.0005 - 0.010)									341
			1985	0/141		---	(0.2)	18/141		0.032 - 0.31	(0.03)	18/129		0.002 - 0.016	(0.002)					
			1998													A 26/27	9/9	1.2 - 30ng/m3	(0.61)	
342	2,7-dimethylnaphthalene	582-16-1	1998													A 27/27	9/9	0.31 - 22ng/m3	(0.3)	342
343	N,N'-dimethyl-p-nitrosoaniline	138-89-6	1980	0/27		---	(0.2)													343
344	2,4-dimethylphenol	105-67-9	1982	0/33		---	(0.04 - 0.5)	0/33		---	(0.0002 - 0.02)									344
345	2,5-dimethylphenol	95-87-4	1982	0/33		---	(0.04 - 0.5)	0/33		---	(0.0002 - 0.02)									345
346	3,5-dimethylphenol	108-68-9	1982	0/33		---	(0.04 - 0.5)	6/33		0.0005 - 0.0022	(0.0002 - 0.02)									346
347	di(alpha-methylbenzyl)phenol	2769-94-0	1981	0/27		---	(0.03 - 0.05)	6/27		0.16 - 0.3	(0.002 - 0.01)									347
348	N,N'-dimethylformamide	68-12-2	1978	0/24		---	(10 - 50)	0/24		---	(0.1 - 0.3)									348
			1991	18/48		0.1 - 6.6	(0.1)	9/48		0.03 - 0.11	(0.013)					A 21/49		110 - 1100ng/m3	(110)	
			1997													A 30/49		20 - 620ng/m3	(20)	
			1998	5/36	2/12	0.08 - 0.11	(0.07)	10/36	4/12	0.0033 - 0.03	(0.003)									
349	dimethoate	60-51-5	1986	0/39		---	(0.3)	0/39		---	(0.03)									349
			1993	0/30		---	(0.1)	0/30		---	(0.71)	0/30		---	(4)					
350	4,4'-dimethoxydiphenylamine	101-70-2	1977	0/ 6		---	(2 - 5)	0/ 6		---	(1)									350

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#	Substance	CAS NO.	Fis. Year	Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				#
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
351	ethyl bromide	74-96-4	1976	0/60		---	(160 - 450)	0/40		---	(1.54 - 2.3)	0/20		---	(0.77 - 2.0)					351
			1983													A 15/101		0.002 - 0.059ppb	(0.001 - 0.017)	
			1997													A 5/30		5.9 - 53ng/m3	(5.4)	
			1998													A 0/36	0/12	--- ng/m3	(40)	
352	vinyl bromide	593-60-2	1981	0/15		---	(1)	0/15		---	(0.005 - 0.006)									352
353	methyl bromide	74-83-9	1976	0/60		---	(1.8 - 19)	0/40		---	(0.024 - 0.95)	0/20		---	(0.012 - 0.05)					353
			1980													A 5/27		0.015 - 0.031ppb	(0.015 - 0.1)	
			1998													A 36/39	13/14	49 - 340ng/m3	(41)	
354	hydrogenated terphenyls	61788-32-7	1977	0/15		---	(10 - 20)	0/15		---	(0.5 - 2)									354
355	styrene	100-42-5	1977	0/ 3		---	(2)	0/ 3		---	(0.006)									355
			1985	0/27		---	(0.1)	1/21		0.001	(0.001)									
			1986	7/121		0.03 - 0.5	(0.03)	13/125		0.0005 - 0.0075	(0.0005)	28/131		0.0005 - 0.0023	(0.0005)					
			1997	0/36		---	(0.2)	0/33		---	(0.0078)									
			1998													A 42/42	14/14	39 - 2700ng/m3	(33)	
356	dioctyl sebacate	122-62-3	1981	0/21		---	(0.8 - 4)	0/21		---	(0.04 - 0.4)									356
357	dibutyl sebacate	109-43-3	1981	0/21		---	(0.8 - 4)	0/21		---	(0.04 - 0.4)									357
358	solvent yellow 14	842-07-9	1988	0/72		---	(0.5)	0/72		---	(0.10)									358
359	o-terphenyl	84-15-1	1976	0/68		---	(0.004 - 25)	15/63		0.00075 - 0.39	(0.00019 - 0.25)	0/ 1		---	(0.05)					359
			1977	0/117		---	(0.0014 - 20)	10/117		0.0012 - 0.1	(0.00016 - 1.6)	0/93		---	(0.000028 - 0.5)					
360	m-terphenyl	92-06-8	1976	0/68		---	(0.013 - 125)	31/63		0.001 - 0.21	(0.001 - 1.25)	0/ 1		---	(0.25)					360
			1977	0/117		---	(0.005 - 13)	12/117		0.0021 - 0.19	(0.00069 - 1)	1/93		0.0024	(0.0001 - 1)					
361	p-terphenyl	92-94-4	1976	0/68		---	(0.025 - 125)	21/63		0.001 - 0.18	(0.001 - 1.25)	0/ 1		---	(0.25)					361
			1977	0/117		---	(0.01 - 20)	7/117		0.0034 - 0.15	(0.0013 - 1.2)	0/93		---	(0.0002 - 1)					
362	thiabendazole	148-79-8	1986	0/27		---	(1)	0/27		---	(0.2)									362
363	distearyl thiodipropionate	693-36-7	1981	0/ 9		---	(0.16 - 1)	0/ 9		---	(0.008 - 0.05)									363
364	dilauryl thiodipropionate	123-28-4	1981	0/ 9		---	(0.16 - 1)	0/ 9		---	(0.008 - 0.05)									364
365	thiourea	62-56-6	1977	0/ 6		---	(1.1 - 400)	0/ 6		---	(0.055 - 1)									365
366	4,4'-thiobis(6-tert-butyl-3-methylphenol)	96-69-5	1981	0/18		---	(1 - 5)	0/18		---	(0.01 - 0.2)									366
367	thiophene	110-02-1	1985	0/24		---	(0.005)	3/24		0.0002 - 0.0015	(0.0001)									367

Surveyed Chemical Substances and their Detected Levels in the Environment
(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection: Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				#
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
368	O,O-diethyl O-2-isopropyl-4-methyl-6-pyrimidyl thiophosphate	333-41-5	1983	0/30		---	(0.1)	0/30		---	(0.005 - 0.019)									368
			1993													A 0/51		--- ng/m3	(12)	
369	O,O'-diethyl-O-alpha-cyanobenzylideneamino phosphorothioate	14816-18-3	1988	0/72		---	(0.6)	0/72		---	(0.074)	0/72		---	(0.03)	A 0/72		--- ng/m3	(10)	369
370	O,O'-diethyl-O-3,5,6-trichloro-2-pyridyl phosphorothioate	2921-88-2	1983	0/30		---	(0.1)	0/30		---	(0.005 - 0.035)									370
			1988	0/72		---	(0.1)	11/69		0.007 - 0.08	(0.007)	0/72		---	(0.005)	A 0/72		--- ng/m3	(10)	
			1990	0/24		---	(0.1)	9/24		0.0074 - 0.033	(0.005)									
371	O,O-dimethyl O-4-nitro-m-tolyl thiophosphate	122-14-5	1983	0/30		---	(0.0064 - 0.4)	0/30		---	(0.0012 - 0.02)									371
			1993													A 2/45		20 - 45ng/m3	(10)	
372	dieldrin	60-57-1	1974	0/60		---	(0.1)	0/60		---	(0.01)	0/60		---	(0.005)					372
373	decanol	112-30-1	1979	0/27		---	(5 - 50)	0/27		---	(0.3 - 1)									373
374	cis-decahydronaphthalene	91-17-8	1984	0/18		---	(0.02 - 0.1)	0/18		---	(0.005 - 0.022)									374
375	trans-decahydronaphthalene	91-17-8	1984	0/18		---	(0.01 - 0.07)	4/18		0.006 - 0.181	(0.002 - 0.016)									375
376	decabromodiphenyl ether	1163-19-5	1977	0/15		---	(0.2 - 2.5)	0/15		---	(0.025 - 0.87)									376
			1987	0/75		---	(0.1)	16/60		0.010 - 1.37	(0.007)	0/75		---	(0.005)					
			1988	0/141		---	(0.06)	39/129		0.004 - 6	(0.004)	0/138		---	(0.005)					
			1996	0/33		---	(0.2)	15/33		0.030 - 0.58	(0.025)	0/138		---	(0.005)					
377	decabromobiphenyl	13654-09-6	1989	0/63		---	(0.3)	0/63		---	(0.03)	0/63		---	(0.03)	A 0/38		--- ng/m3	(20)	377
378	tetraethylthiuram disulfide	97-77-8	1992	0/30		---	(2.64)													378
379	tetraethoxysilane	78-10-4	1992													A 0/18		--- ng/m3	(2.5)	379
380	tetrachloroisophthalonitrile	1897-45-6	1977	0/ 3		---	(10)	0/ 3		---	(0.1)									380
			1991	0/57		---	(0.13)	0/30		---	(0.05)	0/30		---	(0.04)	A 0/51		--- ng/m3	(5)	
381	1,1,2,2-tetrachloroethane	79-34-5	1976	0/60		---	(1 - 50)	0/40		---	(0.05 - 1.0)	0/10		---	(0.2)					381
382	tetrachloroethylene	127-18-4	1974	5/60		3	(0.2 - 2)									R 0/18		---ppm	(0.0002 - 0.002)	382
			1975	73/395		0.15 - 9.5	(0.06 - 0.2)									R 3/114		0.0002 - 0.0003ppm	(0.00006 - 0.0002)	
			1979													A 33/45		0.02 - 1.5ppb	(0.004 - 0.12)	
			1980													A 103/135		0.01 - 1.7ppb	(0.004 - 0.12)	
			1983													A 107/108		0.01 - 1.5ppb	(0.008 - 0.02)	

Surveyed Chemical Substances and their Detected Levels in the Environment
(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
383	cis-N-(1,1,2,2-tetrachloroethylthio)-4-cyclohexene-1,2-dicarboximide	2425-06-1	1980	0/18		---	(0.03 - 0.1)	0/18		---	(0.001 - 0.005)									383
384	2,2',3,3'-tetrachloro-4,4'-diaminodiphenylmethane	42240-73-3	1985	0/30		---	(5)	0/24		---	(0.8)									384
385	3,3',5,5'-tetrachloro-4,4'-diaminodiphenylmethane	25464-95-3	1985	0/30		---	(5)	0/24		---	(0.1)									385
386	2,3,4,6-tetrachlorophenol	58-90-2	1978	0/21		---	(0.04 - 0.3)	0/21		---	(0.003 - 0.03)									386
			1996	0/33		---	(0.25)	0/33		---	(0.009)									
387	1,2,3,4-tetrachlorobenzene	634-66-2	1975	0/100		---	(0.05)	0/100		---	(0.05)	0/95		---	(0.05)	R 0/30		---ppm	(0.05)	387
388	1,2,3,5-tetrachlorobenzene	634-90-2	1975	0/100		---	(0.05)	0/100		---	(0.05)	0/95		---	(0.05)	R 0/30		---ppm	(0.05)	388
389	1,2,4,5-tetrachlorobenzene	95-94-3	1975	0/100		---	(0.05)	0/100		---	(0.05)	0/95		---	(0.05)	R 0/30		---ppm	(0.05)	389
390	tetrahydrothiophene-1,1-dioxide	126-33-0	1976	0/60		---	(0.16 - 1)	0/55		---	(0.007 - 0.260)	0/ 1		---	(0.02)					390
391	tetrahydronaphthalene	119-64-2	1977	0/ 9		---	(0.1 - 1)	0/ 6		---	(0.004 - 0.1)									391
392	tetrahydrofuran	109-99-9	1979	0/33		---	(0.2 - 25)	0/33		---	(0.0001 - 0.033)									392
			1996	0/33		---	(1)									A 5/18		220 - 810ng/m3	(110)	
393	tetraphenylstannane	595-90-4	1997	0/159		---	(0.05)	9/126		0.0060 - 0.50	(0.0058)	7/144		0.00098 - 0.0053	(0.00088)					393
394	1,1,2,2-tetrabromoethane	79-27-6	1976	0/60		---	(0.2 - 0.5)	0/40		---	(0.005 - 0.013)	0/20		---	(0.005 - 0.0065)					394
395	tetrabromobisphenol A	79-94-7	1977	0/15		---	(0.02 - 0.04)	0/15		---	(0.0013 - 0.007)									395
			1987	1/75		0.05	(0.03)	14/66		0.002 - 0.150	(0.002)	0/75		---	(0.001)					
			1988	0/150		---	(0.04)	20/130		0.002 - 0.108	(0.002)	0/135		---	(0.001)					
396	tetrabromobiphenyl	40088-45-7	1989	0/63		---	(0.012)	0/63		---	(0.0016)	0/63		---	(0.001)	A 0/38		--- ng/m3	(1.0)	396
397	1,2,4,5-tetrabromobenzene	636-28-2	1981	0/18		---	(0.01 - 0.02)	0/18		---	(0.0002 - 0.00025)									397
398	tetrabromomethane	558-13-4	1981	0/15		---	(0.004 - 3)	0/15		---	(0.00078 - 0.012)									398
399	2,2,3,3-tetrafluoropropanoic acid	756-09-2	1984	0/21		---	(0.1 - 2)	0/21		---	(0.001 - 0.02)									399
400	tetramethylthiuram disulfide	137-26-8	1985	0/27		---	(0.9)	0/27		---	(0.02)									400
			1992	0/30		---	(1)													
401	tetramethylthiuram monosulfide	97-74-5	1985	0/27		---	(0.9)	0/27		---	(0.009)									401
			1992	0/30		---	(1)	0/30		---	(0.02)									

Surveyed Chemical Substances and their Detected Levels in the Environment
(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
402	terephthalic acid	100-21-0	1975	6/100		0.2 - 0.7	(0.02 - 5)													402
			1983	0/24		---	(2 - 50)	0/24		---	(0.05 - 0.28)									
403	dimethyl terephthalate	120-61-6	1975	1/100		0.16	(0.002 - 0.5)													403
			1982	0/18		---	(0.2 - 0.5)	0/18		---	(0.008 - 0.015)									
404	telodrin	297-78-9	1974	0/60		---	(0.1)	0/60		---	(0.01)	0/60		---	(0.005)					404
405	toxaphene	8001-35-2	1983	0/33		---	(0.3 - 0.6)	0/33		---	(0.01 - 0.04)									405
406	dodecachloro-dodecahydro-dimethanodibenzo-cyclooctene	13560-89-9	1976	4/60		0.4 - 0.6	(0.28 - 0.5)	0/53		---	(0.01 - 0.03)	0/ 2		---	(0.015)					406
407	triallylamine	102-70-5	1981	0/27		---	(1 - 5)	0/27		---	(0.01 - 0.02)									407
408	triethanolamine	102-71-6	1978	0/12		---	(0.3 - 1.3)													408
409	triethylamine	121-44-8	1981	0/27		---	(0.7 - 2)	0/27		---	(0.005 - 0.01)									409
			1991	3/27		0.39 - 0.56	(0.2)	15/33		0.012 - 0.064	(0.012)									
410	triethylbiphenyl	42343-17-9	1976	0/68		---	(3.5 - 40)	0/50		---	(0.5 - 5.0)	0/20		---	(0.70 - 2.0)					410
411	triethylene glycol ethyl ether	112-50-5	1988	0/75		---	(2.2)	0/75		---	(0.24)									411
412	triethylene glycol methyl ether	112-35-6	1988	0/75		---	(4.1)	0/75		---	(0.23)									412
413	trioctylamine	1116-76-3	1981	0/27		---	(1)	0/27		---	(0.005 - 0.01)									413
414	trioctyltin compounds		1984	0/21		---	(1)	0/21		---	(0.07 - 0.14)									414
415	triclosan	3380-34-5	1995	0/33		---	(0.05)	19/24		0.005 - 0.0079	(0.0046)	0/33		---	(0.003)					415
416	trichlorfon	52-68-6	1993	0/33		---	(0.2)	0/33		---	(0.008)	0/33		---	(0.004)					416
417	2,4,5-trichloroaniline	636-30-6	1981	0/15		---	(0.001 - 0.005)	0/15		---	(0.0002 - 0.001)									417
418	2,4,6-trichloroaniline	634-93-5	1981	0/15		---	(0.001 - 0.006)	0/15		---	(0.0002 - 0.001)									418
419	1,1,1-trichloroethane	71-55-6	1974	0/60		---	(0.1 - 2)									R 0/18		--- ppm	(0.0001 - 0.002)	419
			1975	43/395		0.06 - 5.4	(0.05 - 0.4)									R 0/114		--- ppm	(0.00005 - 0.0004)	
			1979													A 26/48		0.02 - 0.71ppb	(0.002 - 0.18)	
			1980													A 78/135		0.01 - 3.2ppb	(0.002 - 0.2)	
			1983													A 95/108		0.010 - 3.40ppb	(0.001 - 0.03)	
420	1,1,2-trichloroethane	79-00-5	1976	0/60		---	(4 - 50)	0/40		---	(0.3 - 1.0)	0/10		---	(0.4)					420
421	2,2,2-trichloro-1,1-ethanediol	302-17-0	1986	0/27		---	(1)	0/21		---	(0.006)									421

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#	Substance	CAS NO.	Fis. Year	Water(ng/ml) A/B	Water C/D	Water Range of detection	Water Limit of detection	Sediment(ug/g-dry) A/B	Sediment C/D	Sediment Range of detection	Sediment Limit of detection	Fishes(ug/g-wet) A/B	Fishes C/D	Fishes Range of detection	Fishes Limit of detection	Others A:Air; R:Rain Water; P:Plankton A/B	Others C/D	Others Range of detection	Others Limit of detection	#
422	trichloroethylene	79-01-6	1974	1/60		5	(1)									R 0/18		--- ppm	(0.0002 - 0.005)	422
			1975	75/395		0.29 - 12	(0.2 - 1)									R 2/114		0.0002 - 0.001ppm	(0.0001 - 0.001)	
			1979													A 21/48		0.016 - 5.9ppb	(0.005 - 0.60)	
			1980													A 64/135		0.007 - 2ppb	(0.005 - 1)	
			1983													A 88/108		0.01 - 1.5ppb	(0.01 - 0.13)	
423	trichloroacetic acid	76-03-9	1984	0/21		---	(5)	0/21		---	(0.02 - 0.05)									423
424	1,1,2-trichloro-1,2,2-trifluoroethane	76-13-1	1981	0/27		---	(0.002 - 20)	0/27		---	(0.00002 - 0.02)									424
			1983													A 100/100		0.003 - 4.54ppb	(0.0003 - 0.005)	
425	2,4,6-trichloronitrobenzene	18708-70-8	1984	0/24		---	(0.002 - 0.03)	0/24		---	(0.00019 - 0.003)									425
426	1,1,1-trichloro-2,2-bis(4-methoxyphenyl)ethane	72-43-5	1985	0/27		---	(0.01)	0/27		---	(0.02)									426
427	2,4,6-trichlorophenyl-4'-nitrophenyl ether	1836-77-7	1978	0/18		---	(0.006 - 0.03)	0/18		---	(0.0003 - 0.003)									427
			1982	5/54		0.001 - 0.003	(0.001 - 0.2)	8/54		0.0007 - 0.006	(0.0001 - 0.009)									
			1991	0/57		---	(0.35)	0/51		---	(0.043)					A 0/54		--- ng/m3	(21)	
428	2,4,5-trichlorophenoxyacetic acid	93-76-5	1983	0/45		---	(0.01 - 3)	0/45		---	(0.0002 - 0.13)									428
429	2,4,5-trichlorophenol	95-95-4	1978	0/21		---	(0.02 - 0.08)	0/21		---	(0.001 - 0.008)									429
			1996	0/33		---	(0.2)	0/30		---	(0.0063)									
430	2,4,6-trichlorophenol	88-06-2	1978	0/21		---	(0.008 - 0.1)	1/21		0.0008	(0.0006 - 0.01)									430
			1996	0/33		---	(0.15)	1/30		0.012	(0.009)									
431	1,2,3-trichloropropane	96-18-4	1976	0/60		---	(10 - 20)	0/40		---	(0.2 - 2)	0/10		---	(2.4)					431
432	trichlorofluoromethane	75-69-4	1976													A 90/115		0.002 - 0.45ppb	(0.0021)	432
			1977													A 71/97		0.02 - 0.9ppb	(0.01 - 1)	
433	1,2,3-trichlorobenzene	87-61-6	1975	0/95		---	(0.08 - 0.3)	0/95		---	(0.002 - 0.1)	0/75		---	(0.005 - 0.1)	R 0/24		--- ppm	(0.00008 - 0.0003)	433
			1979	2/111		0.05 - 0.07	(0.01 - 0.4)	19/111		0.0004 - 0.058	(0.0001 - 0.1)	0/93		---	(0.0001 - 0.1)					
			1986													A 22/73		1.1 - 12ng/m3	(1.0)	

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
434	1,2,4-trichlorobenzene	120-82-1	1975	0/95		---	(0.03 - 0.4)	3/95		0.002 - 0.022	(0.002 - 0.1)	2/75		0.1 - 0.2	(0.0005 - 0.1)	R 0/24		--- ppm	(0.00003 - 0.0004)	434
			1979	8/111		0.01 - 0.13	(0.01 - 0.4)	33/111		0.0005 - 0.030	(0.0001 - 0.1)	7/93		0.0003 - 0.008	(0.0001 - 0.1)					
			1986													A 63/73		1.2 - 78ng/m3	(1.0)	
435	1,3,5-trichlorobenzene	108-70-3	1975	0/95		---	(0.02 - 0.2)	0/95		---	(0.001 - 0.1)	0/75		---	(0.003 - 0.1)	R 0/24		--- ppm	(0.00002 - 0.0002)	435
			1979	1/111		0.02	(0.01 - 0.4)	18/111		0.0006 - 0.0247	(0.0001 - 0.1)	1/93		0.012	(0.0001 - 0.1)					
			1986													A 7/73		1.0 - 8.6ng/m3	(1.0)	
436	trichloromethane	67-66-3	1974	21/60		1.4 - 70	(1)									R 6/18		0.01 - 0.118ppm	(0.0002)	436
			1975	86/359		0.09 - 17	(0.08 - 1)									R 25/114		0.0001 - 0.043ppm	(0.00008 - 0.001)	
			1979													A 22/44		0.023 - 5.0ppb	(0.02 - 1)	
			1980													A 57/132		0.017 - 4.6ppb	(0.014 - 1)	
			1983													A 88/108		0.01 - 2.2ppb	(0.01 - 0.10)	
437	1,1,1-trichloro-2-methyl-2-propanol	57-15-8	1980	0/33		---	(0.02 - 20)	0/33		---	(0.00049 - 0.1)									437
			1988	0/72		---	(0.5)	0/72		---	(0.06)					A 1/72		57ng/m^3	(25)	
438	tricyclohexyltin hydroxide	13121-70-5	1986	0/30		---	(2)	0/18		---	(0.04)									438
439	o-tolidine	119-93-7	1977	0/ 6		---	(0.02)	0/ 3		---	(0.002)									439
440	1,3,5-tris(2'-hydroxyethyl) isocyanuric acid	839-90-7	1979	0/18		---	(5 - 10)	0/18		---	(0.002 - 0.07)									440
441	tris(2-hydroxypropyl)amine	122-20-3	1981	0/24		---	(10 - 20)	0/24		---	(0.08 - 0.1)									441
442	1-tridecyl alcohol	112-70-9	1977	0/ 6		---	(300)	0/ 6		---	(6)									442
443	triphenyltin compounds		1982	0/69		---	(0.1 - 35)	0/69		---	(0.01 - 1.8)									443
			1988	73/119		0.005 - 0.088	(0.005)	99/129		0.001 - 1.1	(0.001)	118/144		0.02 - 2.6	(0.02)					
444	triphenylmethane	519-73-3	1983	0/33		---	(0.2 - 0.4)	0/33		---	(0.008 - 0.041)									444
445	tri-n-butylamine	102-82-9	1986	0/30		---	(3)	0/27		---	(0.08)									445
446	tributyltin compounds		1983	0/75		---	(0.1 - 1)	9/75		0.05 - 0.70	(0.01 - 0.08)									446
			1984	0/138		---	(0.1 - 10)	32/138		0.006 - 0.91	(0.006 - 0.21)	29/138		0.009 - 0.48	(0.003 - 0.1)					
447	2,4,6-tri-sec-butylphenol	5892-47-7	1984	0/30		---	(0.1 - 0.3)	0/30		---	(0.001 - 0.0071)									447
448	2,4,6-tri-tert-butylphenol	732-26-3	1984	0/30		---	(0.04 - 0.08)	3/30		0.0023 - 0.0082	(0.0004 - 0.0019)									448
449	trifluralin	1582-09-8	1994	0/30		---	(0.02)	0/30		---	(0.0025)	0/30		---	(0.001)					449
450	tripropyltin compounds		1982	0/60		---	(0.1 - 2)	0/60		---	(0.01 - 0.12)									450

Surveyed Chemical Substances and their Detected Levels in the Environment
(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
451	2,4,6-tribromophenyl(2-methyl-2,3-dibromopropyl)ether	36065-30-2	1979	0/21		---	(0.1 - 0.5)	0/21		---	(0.02 - 0.05)									451
452	2,4,6-tribromophenol	118-79-6	1986	0/33		---	(0.006)	2/33		0.0015 - 0.0040	(0.0005)									452
			1996	0/33		---	(0.35)	0/30		---	(0.009)									
453	1,3,5-tribromobenzene	626-39-1	1981	0/18		---	(0.01 - 0.03)	0/18		---	(0.0002 - 0.0003)									453
454	tribromomethane	75-25-2	1976	0/60		---	(0.2 - 26)	0/40		---	(0.005 - 0.35)	0/20		---	(0.005 - 0.0065)					454
			1980													A 0/63		--- ppb	(0.004 - 0.3)	
455	trimethylamine	75-50-3	1986	0/33		---	(3)	4/27		0.13 - 0.63	(0.08)									455
			1991													A 1/48		150ng/m^3	(150)	
456	3,5,5-trimethyl-2-cyclohexene-1-one	78-59-1	1981	0/36		---	(0.02 - 10)	18/36		0.0006 - 0.0066	(0.0003 - 0.2)									456
			1995	5/165		0.031 - 0.048	(0.0235)	97/154		0.00014 - 0.81	(0.00014)	32/141		0.00023 - 0.017	(0.00021)					
457	2,2,4-trimethyl-1,2-dihydroquinoline	147-47-7	1980	0/42		---	(0.5 - 5)	0/42		---	(0.025 - 0.7)									457
458	tri(alpha-methylbenzyl)phenol	18254-13-2	1981	0/27		---	(0.04 - 0.06)	12/27		0.019 - 0.42	(0.006 - 0.03)									458
459	1,2,3-trimethylbenzene	526-73-8	1976	0/20		---	(0.1)	0/20		---	(0.01)									459
460	1,2,4-trimethylbenzene	95-63-6	1976	0/20		---	(0.1)	0/20		---	(0.01)									460
			1998													A 39/42	13/14	370 - 10000ng/m3	(370)	
461	1,3,5-trimethylbenzene	108-67-8	1976	0/20		---	(0.1)	0/20		---	(0.01)									461
			1998													A R74238/3	13/13	90 - 5400ng/m3	(40)	
462	2,2,4-trimethyl-1,3-pentanediol diisobutyrate	6846-50-0	1995	5/165		0.10 - 0.16	(0.1)	6/168		0.023 - 0.095	(0.02)	18/156		0.0063 - 0.044	(0.0062)					462
463	trimellitic acid	528-44-9	1986	0/30		---	(1)	0/30		---	(0.03)									463
464	o-tolylamine	95-53-4	1976	8/68		0.14 - 20	(0.1 - 0.6)	27/68		0.002 - 0.013	(0.002 - 0.012)									464
			1985													A 0/72		--- ng/m3	(0.05 - 150)	
			1998	0/39	0/13	---	(0.08)	7/36	3/12	0.0054 - 0.0074	(0.0043)									
465	m-toluamine	108-44-1	1976	4/68		0.096 - 0.26	(0.08 - 0.2)	32/68		0.002 - 0.056	(0.001 - 0.004)									465
			1985													A 0/72		--- ng/m3	(0.02 - 100)	
			1998	0/39	0/13	---	(0.2)	0/39	0/13	---	(0.01)									

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(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
466	p-toluidine	106-49-0	1976	11/68		0.032 - 0.18	(0.02 - 0.2)	35/68		0.0007 - 0.090	(0.0004 - 0.0008)									466
			1985													A 0/72		--- ng/m3	(0.02 - 50)	
			1998	0/39	0/13	---	(0.09)	0/36	0/12	---	(0.007)									
467	p-toluidine-2-sulfonic acid	88-44-8	1980	0/24		---	(10 - 200)	0/24		---	(0.5 - 11)									467
468	2,3-tolylenediamine	2687-25-4	1978	0/24		---	(1 - 20)	0/24		---	(0.7 - 1.1)									468
469	2,4-tolylenediamine	95-80-7	1978	0/24		---	(2 - 5)	0/24		---	(1.0 - 2.2)									469
			1990													A 0/51		--- ng/m3	(270)	
470	2,6-tolylenediamine	823-40-5	1990													A 0/51		--- ng/m3	(270)	470
471	toluene	108-88-3	1977	0/ 3		---	(2)	0/ 3		---	(0.004)									471
			1985	9/21		0.10 - 0.23	(0.06)	9/21		0.0004 - 0.010	(0.0004)									
			1986	29/91		0.03 - 2.7	(0.03)	46/87		0.0005 - 0.044	(0.0005)	31/105		0.003 - 0.020	(0.003)					
			1998													A 42/42	14/14	1100 - 85000ng/m3	(80)	
472	p-toluenesulfonyl chloride	98-59-9	1977	0/ 6		---	(4 - 10)	0/ 6		---	(0.1 - 0.25)									472
473	o-toluenesulfonamide	88-19-7	1977	0/ 6		---	(10)	0/ 6		---	(0.005 - 0.048)									473
			1992	6/84		0.27 - 0.67	(0.2)	6/84		0.0089 - 0.045	(0.008)									
474	p-toluenesulfonamide	70-55-3	1992	9/162		0.52 - 0.84	(0.3)	26/162		0.0085 - 0.854	(0.0083)									474
475	naphthalene	91-20-3	1976	0/20		---	(0.1)	0/20		---	(0.01)									475
476	1-naphthaleneacetic acid	86-87-3	1984	0/27		---	(0.02 - 0.05)	0/27		---	(0.002 - 0.0063)									476
477	beta-naphthalenesulfonic acid, formalic condensed, sodium salt		1979	0/21		---	(10 - 100)	0/27		---	(0.2 - 30)									477
478	1-naphthylamine	134-32-7	1976	0/60		---	(0.1 - 0.7)	7/60		0.007 - 0.046	(0.003 - 0.01)									478
			1979	0/111		---	(0.014 - 5)	3/111		0.0050 - 0.0055	(0.004 - 0.01)	0/93		---	(0.0007 - 0.05)					
			1985					0/147		---	(0.002)									
479	2-naphthylamine	91-59-8	1983	0/48		---	(0.02 - 0.1)	5/48		0.0017 - 0.0079	(0.0015 - 0.04)									479
			1985					6/147		0.0023 - 0.051	(0.002)									
480	1,4-naphthoquinone	130-15-4	1985	0/30		---	(4)	0/30		---	(0.05)									480
481	1-naphthol	90-15-3	1977	0/ 6		---	(0.4 - 4.5)	0/ 6		---	(0.04 - 0.29)									481
482	2-naphthol	135-19-3	1977	0/ 6		---	(0.4 - 6)	0/ 6		---	(0.04 - 0.39)									482
483	nitrilotriacetic acid	139-13-9	1980	2/36		1	(1)	3/36		0.011 - 0.013	(0.005 - 0.02)									483
			1994	1/21		5	(5)	0/21		---	(0.2)	0/18		---	(0.5)					

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
484	3-nitroacenaphthene	3807-77-0	1984	0/21		---	(0.007 - 0.02)	0/21		---	(0.002 - 0.0071)									484
485	5-nitroacenaphthene	602-87-9	1984	0/21		---	(0.008 - 0.02)	0/21		---	(0.003 - 0.012)									485
486	o-nitroanisole	91-23-6	1976	3/70		0.035 - 0.69	(0.025 - 0.4)	1/58		0.010	(0.001 - 0.010)	0/10		---	(0.002)					486
			1991	0/57		---	(0.37)	1/51		0.027	(0.016)	2/57		0.016 - 0.018	(0.015)					
487	m-nitroanisole	555-03-3	1976	5/62		0.1 - 1.6	(0.05 - 0.1)	1/50		0.015	(0.003 - 0.004)	0/10		---	(0.002)					487
488	p-nitroanisole	100-17-4	1976	0/70		---	(0.08 - 0.2)	0/59		---	(0.006 - 0.02)	1/10		0.013	(0.006)					488
			1991	0/57		---	(0.25)	0/57		---	(0.015)									
489	o-nitroaniline	88-74-4	1978	0/24		---	(0.2 - 0.5)	0/15		---	(0.007 - 0.0167)									489
			1990	0/69		---	(0.19)	0/75		---	(0.04)	0/72		---	(0.014)					
490	m-nitroaniline	99-09-2	1978	0/24		---	(0.3 - 1)	0/15		---	(0.01 - 0.033)									490
491	p-nitroaniline	100-01-6	1978	0/24		---	(0.7 - 1)	0/15		---	(0.02 - 0.033)									491
			1990	0/66		---	(1.5)	0/66		---	(0.18)	0/63		---	(0.062)					
492	m-nitrobenzoic acid	121-92-6	1985	0/33		---	(10)	0/33		---	(0.05)									492
493	nitroethane	79-24-3	1986	0/27		---	(3)	0/27		---	(0.09)									493
494	N-nitrosodiethanolamine	1116-54-7	1994													A 0/30		--- ng/m3	(220)	494
495	N-nitrosodiethylamine	55-18-5	1981	0/36		---	(0.3 - 1)	0/36		---	(0.02 - 0.05)									495
496	4-nitrosodiphenylamine	156-10-5	1977	0/ 6		---	(1 - 5)	0/ 6		---	(0.25 - 1)									496
497	N-nitrosodiphenylamine	86-30-6	1990	2/81		0.5 - 0.9	(0.3)	0/81		---	(0.06)	1/51		0.002	(0.002)					497
498	N-nitrosodimethylamine	62-75-9	1981	0/36		---	(0.2 - 2)	0/36		---	(0.01 - 0.05)									498
499	o-nitrotoluene	88-72-2	1976	3/70		0.15 - 0.79	(0.03 - 0.2)	16/50		0.0034 - 0.14	(0.0002 - 0.002)	0/10		---	(0.002)					499
			1986													A 1/73		$44ng/m^3$	(20)	
			1991	0/57		---	(0.2)	0/57		---	(0.031)	0/57		---	(0.0075)	A 2/54		130 - 200ng/m3	(70)	
500	m-nitrotoluene	99-08-1	1976	3/70		0.35 - 0.86	(0.05 - 0.2)	21/50		0.014 - 0.019	(0.004 - 0.01)	0/10		---	(0.004)					500
			1986													A 0/73		--- ng/m3	(20)	
			1991	0/57		---	(0.2)	0/57		---	(0.017)	0/57		---	(0.0075)					
501	p-nitrotoluene	99-99-0	1976	1/70		0.1	(0.03 - 0.4)	3/59		0.011 - 0.038	(0.002 - 0.01)	0/10		---	(0.002)					501
			1986													A 0/73		--- ng/m3	(20)	
			1991	1/57		0.21	(0.2)	0/57		---	(0.015)	0/57		---	(0.0075)					
502	1-nitronaphthalene	86-57-7	1980	0/33		---	(0.002 - 0.05)	0/33		---	(0.00004 - 0.0013)									502
503	1-nitropyrene	5522-43-0	1990	0/159		---	(0.2)	0/159		---	(0.03)	0/147		---	(0.068)	A 38/46		0.0014 - 0.15ng/m3	(0.001)	503

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
504	o-nitrophenol	88-75-5	1978	0/30		---	(0.4 - 10)	0/30		---	(0.03 - 0.5)									504
			1979	0/111		---	(0.1 - 5)	0/111		---	(0.01 - 0.76)	0/93		---	(0.01 - 0.3)					
			1994	0/36		---	(0.26)	0/36		---	(0.0026)	1/36		0.0084	(0.005)	A 22/27		1 - 140ng/m3	(1)	
505	m-nitrophenol	554-84-7	1978	0/30		---	(0.08 - 10)	0/30		---	(0.006 - 0.5)									505
			1979	0/111		---	(0.04 - 5)	0/111		---	(0.002 - 0.2)	0/93		---	(0.01 - 0.2)					
			1994	0/36		---	(0.4)	0/36		---	(0.0047)	0/36		---	(0.01)	A 0/27		--- ng/m3	(8)	
506	p-nitrophenol	100-02-7	1978	1/30		0.13	(0.08 - 10)	0/30		---	(0.02 - 0.5)									506
			1979	0/111		---	(0.04 - 5)	0/111		---	(0.002 - 0.8)	0/93		---	(0.01 - 0.2)					
			1994	0/36		---	(0.6)	0/36		---	(0.0052)	0/36		---	(0.005)	A 27/27		1 - 71 ng/m3	(1)	
507	3-nitrofluoranthene	892-21-7	1990	0/159		---	(0.2)	0/159		---	(0.04)	0/144		---	(0.05)	A 10/42		0.013 - 0.19ng/m3	(0.012)	507
508	1-nitropropane	108-03-2	1979	0/18		---	(50 - 200)	0/18		---	(0.8 - 1.0)									508
			1986	0/27		---	(3)	0/27		---	(0.4)									
509	2-nitropropane	79-46-9	1979	0/18		---	(50 - 200)	0/18		---	(0.3 - 1.0)									509
			1986	0/27		---	(3)	0/27		---	(0.2)									
510	nitrobenzene	98-95-3	1976	27/70		0.1 - 1.4	(0.03 - 0.4)	15/47		0.0095 - 1.9	(0.002 - 0.0035)	10/10		0.003 - 0.58	(---)					510
			1977	22/115		0.13 - 3.8	(0.1 - 30)	19/117		0.009 - 1.5	(0.001 - 1)	9/85		0.003 - 0.005	(0.001 - 0.2)					
			1986													A 1/73		140ng/m^3	(100)	
			1991	1/153		0.17	(0.15)	2/162		0.047 - 0.07	(0.023)	4/147		0.011 - 0.026	(0.0087)	A 42/49		2.2 - 160ng/m3	(2)	
511	m-nitrobenzenesulfonic acid, sodium salt	127-68-4	1977	0/ 6		---	(6.6 - 10)	0/ 6		---	(0.5 - 0.78)									511
512	5-nitrobenzimidazole	94-52-0	1985	0/30		---	(0.7)	0/30		---	(0.2)									512
513	nitromethane	75-52-5	1986	0/27		---	(1)	0/27		---	(0.06)									513
514	2-nitro-4-methylphenol	119-33-5	1984	0/21		---	(0.1 - 0.3)	0/21		---	(0.01 - 0.054)									514
515	3-nitro-4-methylphenol	2042-14-0	1984	0/21		---	(0.06 - 0.2)	0/21		---	(0.006 - 0.030)									515
516	4-nitro-3-methylphenol	2581-34-2	1984	0/21		---	(0.06 - 0.2)	0/21		---	(0.006 - 0.028)									516
517	5-nitro-2-methylphenol	5428-54-6	1984	0/21		---	(0.08 - 0.2)	0/21		---	(0.008 - 0.039)									517
518	carbon disulfide	75-15-0	1977	0/ 6		---	(0.056 - 0.1)	0/ 6		---	(0.0015 - 0.01)									518
			1992													A 5/51		530 - 1,900ng/m3	(500)	
519	neopentyl glycol	126-30-7	1977	0/ 6		---	(200 - 400)	0/ 6		---	(2)									519
520	nereistoxin	1631-58-9	1993	0/30		---	(0.2)	0/30		---	(0.024)	0/30		---	(0.01)					520

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(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection: Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				#
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
521	cis-nonachlor	5103-73-1	1982	0/126		---	(0.005)	43/126		0.0002 - 0.022	(0.0002 - 0.001)	76/123		0.001 - 0.023	(0.001)					521
			1986													A 0/73		--- ng/m3	(0.7)	
522	trans-nonachlor	39765-80-5	1982	0/126		---	(0.005)	68/126		0.0002 - 0.055	(0.0002 - 0.001)	102/123		0.001 - 0.074	(0.001)					522
			1986													A 16/73		0.52 - 2.8ng/m3	(0.5)	
523	nonanol	143-08-8, 28473-21-4	1979	0/27		---	(5 - 50)	0/27		---	(0.3 - 1)									523
			1995	0/33		---	(4)	3/30		0.304 - 0.392	(0.1)					A 14/18		8.7 - 81ng/m3	(6)	
524	nonylphenol	25154-52-3	1976	0/ 8		---	(5)	0/ 8		---	(0.25)									524
			1977	0/ 3		---	(0.4)	3/ 3		0.05 - 0.07	(---)									
			1997	0/123		---	(1.1)	43/129		0.17 - 1.3	(0.15)									
525	picric acid	88-89-1	1980	0/ 9		---	(1)	0/ 9		---	(0.1 - 0.23)									525
526	4,4'-bis(4-anilino-6-morpholino-1,3,5-triazine-2-yl)aminostylbene-2,2'-disulfonic acid disodium salt	16090-02-1	1982	0/45		---	(0.6 - 2)	13/45		0.04 - 0.2	(0.05 - 0.12)									526
527	2,4-bis(ethylamino)-6-methylthio-1,3,5-triazine	1014-70-6	1992	6/78		0.1 - 0.27	(0.05)	2/78		0.016 - 0.023	(0.011)	0/75		---	(0.0078)					527
528	bis(2-chloroisopropyl) ether	108-60-1	1984	0/24		---	(0.1)	0/24		---	(0.003 - 0.015)									528
529	bis(2-chloroethyl) ether	111-44-4	1977	0/ 6		---	(2 - 5)	0/ 6		---	(0.5 - 0.6)									529
			1984	0/24		---	(0.07 - 0.1)	0/24		---	(0.003 - 0.008)									
			1995	6/27		0.03 - 0.071	(0.02)	0/33		---	(0.01)	0/33		---	(0.6)					
			1996													A 0/18		--- ng/m3	(56)	
530	1,1-bis(p-chlorophenyl)-2,2,2-trichloroethanol	115-32-2	1978	0/24		---	(0.02 - 0.2)	0/24		---	(0.003 - 0.011)									530
531	4,4'-bis(dimethylaminophenyl)methane	101-61-1	1986	0/30		---	(2)	0/24		---	(0.05)									531
532	4,4'-bis(dimethylamino)benzophenone	90-94-8	1985	0/24		---	(0.5)	0/24		---	(0.02)									532
533	4,4'-bis(2-sulfostylyl)biphenyl disodium salt	27344-41-8	1982	15/45		0.1 - 0.7	(0.1 - 0.2)	25/45		0.01 - 2.1	(0.005 - 0.04)									533
534	bis(2,3,3,3-tetrachloropropyl) ether	127-90-2	1981	0/24		---	(0.01 - 0.025)	0/24		---	(0.001 - 0.0029)									534
			1984	0/24		---	(0.001 - 0.002)	0/24		---	(0.00005 - 0.00023)									

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
535	bis(tribromophenoxy) ethane	37853-59-1	1987	0/75		---	(0.04)	6/60		0.0032 - 0.366	(0.003)	0/75		---	(0.002)					535
536	2,2-bis[4-(2-hydroxyethoxy)-3,5-dibromophenyl]propane	4162-45-2	1986	2/30		0.02 - 0.04	(0.02)	0/30		---	(0.02)									536
537	2,2-bis(4-hydroxyphenyl)propane	80-05-7	1976	0/60		---	(0.05 - 0.1)	0/50		---	(0.0002 - 0.005)	0/10		---	(0.005)					537
			1996	41/148		0.010 - 0.268	(0.01)	79/163		0.0059 - 0.60	(0.005)	7/159		0.015 - 0.287	(0.013)	A 0/18		--- ng/m3	(24)	
538	1,1-bis(t-butylperoxy)-3,3,5-trimethylcyclohexane	6731-36-8	1989	0/69		---	(0.2)	0/69		---	(0.028)	0/63		---	(0.01)					538
			1995	0/33		---	(0.03)	0/3		---	(0.011)	0/33		---	(0.005)					
539	bis(4-bromophenyl)ether	2050-47-7	1984	0/27		---	(0.01 - 0.03)	0/27		---	(0.00005 - 0.013)									539
540	hydrazine	302-01-2	1986	0/30		---	(2)	0/30		---	(0.2)									540
541	2-(2'-hydroxy-3',5'-di-tert-buthylphenyl)-5-chlorobenzotriazol	3864-99-1	1980	0/33		---	(0.4 - 5)	0/33		---	(0.02 - 1)									541
542	2-hydroxy-3-naphthoic aicd anilide	92-77-3	1984	0/24		---	(0.1 - 0.4)	0/24		---	(0.01 - 0.03)									542
543	2-hydroxy-3-naphthoyl-3-chloro-4,6-dimethoxyanilide	92-72-8	1984	0/24		---	(0.1 - 0.4)	0/24		---	(0.01 - 0.04)									543
544	2-hydroxy-3-naphthoyl-4-chloro-2-methylanilide	92-76-2	1984	0/24		---	(0.1 - 0.4)	0/24		---	(0.01 - 0.03)									544
545	2-hydroxy-3-naphthoyl-5-chloro-2-methoxyanilide	137-52-0	1984	0/24		---	(0.1 - 0.4)	0/24		---	(0.01 - 0.03)									545
546	2-hydroxy-3-naphthoyl-3-nitroanilide	135-65-9	1984	0/24		---	(0.1 - 0.4)	0/24		---	(0.01 - 0.03)									546
547	hydrokinone	123-31-9	1996	0/168		---	(0.36)	36/164		0.02 - 0.76	(0.017)									547
548	2-vinylpyridine	100-69-6	1991													A 7/50		17 - 30ng/m3	(16)	548
549	biphenyl	92-52-4	1976	0/68		---	(0.2 - 10)	0 /50		---	(0.05 - 1.0)	0/20		---	(0.04 - 0.25)					549
550	piperazine	110-85-0	1986	0/30		---	(30)	1/24		0.07	(0.03)									550
551	piperidine	110-89-4	1986	0/30		---	(10)	0/24		---	(0.03)									551
552	piperophos	24151-93-7	1993													A 0/54		--- ng/m3	(54)	552
553	pyridine	110-86-1	1980	2/ 9		0.3 - 0.4	(0.1 - 0.2)	6/ 9		0.006 - 0.031	(0.002 - 0.01)									553
			1991	6/36		0.13 - 0.2	(0.1)	18/39		0.0068 - 0.11	(0.005)	19/39		0.0045 - 0.075	(0.003)	A 22/49		24 - 90ng/m3	(24)	
			1997													A 43/53		10 - 210ng/m3	(10)	
			1998	6/33	2/11	0.29 - 0.41	(0.1)	6/33	2/11	0.013 - 0.019	(0.0092)									

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				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
554	pyrene	129-00-0	1989	8/69		0.01 - 0.065	(0.009)	68/71		0.02 - 3.9	(0.006)	10/63		0.0013 - 0.0096	(0.001)	A 39/39		0.26 - 9.07ng/m3	(0.2)	554
555	pyrrolidine	123-75-1	1986	0/30		---	(10)	0/24		---	(0.03)									555
556	pyrrole	109-97-7	1981	0/24		---	(2 - 5)	0/24		---	(0.03 - 0.1)									556
557	phenanthrene	85-01-8	1977	0/ 9		---	(0.02 - 5)	9/ 9		0.009 - 2.8	(---)									557
558	1-phenyl-1-(2,4-dimethylphenyl)ethane	6165-52-2	1980	0/120		---	(0.005 - 20)	3/120		0.022 - 0.027	(0.002 - 1.0)	0/108		---	(0.001 - 2.5)					558
559	1-phenyl-1-(3,4-dimethylphenyl)ethane	6196-95-8	1975	0/100		---	(0.13 - 5)	13/100		0.028 - 0.31	(0.025 - 0.25)	0/94		---	(0.02 - 0.25)					559
			1977	0/117		---	(0.01 - 5)	12/117		0.002 - 0.03	(0.0013 - 0.3)	14/98		0.00052 - 3.0	(0.0002 - 0.8)					
			1980	0/120		---	(0.005 - 20)	3/120		0.019 - 0.027	(0.002 - 1.0)	0/108		---	(0.001 - 2.5)					
560	phenyltin compounds		1989	14/67		0.03 - 47.3	(0.03)	28/55		0.019 - 1.1	(0.015)	28/54		0.015 - 1.1	(0.015)					560
			1998	0/156	0/52	---	(0.01)	31/134	14/46	0.016 - 0.76	(0.016)									
561	N-phenyl-1-naphthylamine	90-30-2	1980	0/36		---	(0.025 - 0.1)	9/36		0.0044 - 0.04	(0.0013 - 0.02)									561
			1981	0/126		---	(0.1)	0/126		---	(0.005)	0/123		---	(0.005)					
562	N-phenyl-2-naphthylamine	135-88-6	1976	0/50		---	(3 - 40)	0/40		---	(0.13 - 0.8)	0/20		---	(0.3 - 1.0)					562
			1980	0/36		---	(0.025 - 0.1)	10/36		0.0045 - 0.042	(0.0013 - 0.02)									
			1981	0/126		---	(0.1)	27/126		0.005 - 0.074	(0.005)	0/123		---	(0.005)					
563	phenylhydrazine	100-63-0	1986	0/30		---	(2)	0/30		---	(0.2)									563
564	o-phenylphenol	90-43-7	1978	0/30		---	(0.02 - 12.5)	0/30		---	(0.02 - 0.68)									564
565	m-phenylphenol	580-51-8	1978	0/30		---	(0.02 - 50)	0/30		---	(0.06 - 2.5)									565
566	p-phenylphenol	92-69-3	1978	0/30		---	(0.02 - 50)	0/30		---	(0.06 - 2.5)									566
567	o-phenylenediamine	95-54-5	1978	0/24		---	(5 - 20)	0/24		---	(1.0 - 2.2)									567
568	m-phenylenediamine	108-45-2	1978	0/24		---	(5 - 20)	0/24		---	(1.0 - 2.2)									568
569	p-phenylenediamine	106-50-3	1978	0/24		---	(5 - 20)	0/24		---	(1.0 - 2.2)									569
570	phenothiazine	92-84-2	1986	0/24		---	(0.5)	0/24		---	(1.5)									570
571	phenol	108-95-2	1977	0/ 9		---	(0.2 - 10)	3/ 9		0.03 - 0.04	(0.01 - 0.1)									571
			1996	76/136		0.030 - 1.47	(0.03)	110/129		0.0055 - 0.94	(0.0054)	63/133		0.020 - 0.586	(0.02)	A 40/47		50.1 - 760ng/m3	(50)	
			1998	15/30	5/10	0.066 - 0.7	(0.03)	23/29	8/10	0.012 - 0.5	(0.0054)	16/30	8/11	0.024 - 0.062	(0.02)					
572	fenthion	55-38-9	1993	0/51		---	(0.2)	0/51		---	(0.033)	0/51		---	(0.05)	A 0/54		--- ng/m3	(15)	572
573	fthalide	27355-22-2	1996	0/33		---	(0.05)	0/33		---	(0.02)									573
574	butachlor	23184-66-9	1994	0/39		---	(0.02)	0/39		---	(0.0044)	0/39		---	(0.002)					574
575	butadiene	106-99-0	1977	0/ 6		---	(0.1 - 5)	0/ 6		---	(0.0005 - 0.005)									575

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				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
576	n-butanol	71-36-3	1979	0/30		---	(100 - 1,000)	0/30		---	(1.0 - 10.0)									576
			1995	2/33		2.3 - 3.7	(2)	4/33		0.14 - 0.78						A 9/15		51 - 1,300ng/m3	(50)	
577	s-butanol	78-92-2	1979	0/30		---	(100 - 1,000)	0/30		---	(1.0 - 10.0)									577
			1995	0/33		---	(10)	2/33		0.029 - 0.049	(0.021)									
578	t-butanol	75-65-0	1979	0/30		---	(100 - 1,000)	0/30		---	(1.0 - 10.0)									578
			1995	0/33		---	(2)	0/33		---						A 12/14		20 - 250ng/m3	(20)	
579	phthalic acid	88-99-3	1983	0/24		---	(1 - 20)	0/24		---	(0.02 - 0.1)									579
580	phthalate esters		1975	54/115		0.0079 - 77	(0.0079 - 10)													580
581	diallyl phthalate	131-17-9	1985	0/27		---	(0.2)	0/27		---	(0.02)									581
582	diethyl phthalate	84-66-2	1985	0/27		---	(0.2)	0/27		---	(0.02)									582
583	di-2-ethylhexyl phthalate	117-81-7	1974	176/375		0.08 - 15	(0.01 - 2)	224/370		0.003 - 17	(0.003 - 0.2)	92/332		0.01 - 19	(0.02 - 1.0)	R 69/111		0.00006 - 0.018ppm	(0.00006 - 0.002)	583
			1974													P 1/4		6.3ppm	(0.05)	
			1975	58/115		0.02 - 1.1	(0.01 - 3)													
			1982	29/45		0.1 - 0.8	(0.04 - 0.15)	45/45		0.009 - 3.5	(0.001 - 0.007)									
			1985													A 59/62		38 - 790ng/m3	(5 - 50)	
			1996	4/33		4.3 - 6.8	(3.9)	16/33		0.18 - 22	(0.15)	9/27		0.15 - 0.96	(0.026)	A 11/18		8 - 323ng/m3	(6)	
584	di-n-octyl phthalate	117-84-0	1974	4/355		1 - 41	(0.05 - 50)	3/331		0.72 - 44	(0.00005 - 5)	0/292		---	(0.00005 - 25)	R 1/105		0.012ppm	(0.0005 - 0.050)	584
			1974													P 0/4		--- ppm	(0.01 - 10)	
			1982	0/45		---	(0.05 - 0.5)	0/45		---	(0.002 - 0.02)									
			1996	0/33		---	(0.2)	3/33		0.28 - 1.41	(0.13)					A 0/18		--- ng/m3	(12)	
585	dicyclohexyl phthalate	84-61-7	1985	0/27		---	(0.4)	0/27		---	(0.05)									585
586	di-i-decyl phthalate	26761-40-0	1974	0/250		---	(0.05 - 10)	0/227		---	(0.00006 - 3.1)	0/200		---	(0.00005 - 5.0)	R 0/73		--- ppm	(0.00006 - 0.010)	586
			1974													P 0/2		--- ppm	(0.01)	
587	diisononyl phthalate	28553-12-0	1996	0/33		---	(4)	0/33		---	(3.5)					A 0/18		--- ng/m3	(72)	587
588	di-i-butyl phthalate	84-69-5	1974	38/375		0.16 - 1.2	(0.01 - 1)	57/350		0.00075 - 3.8	(0.00005 - 0.1)	22/312		0.15 - 0.47	(0.00005 - 0.2)	R 11/111		0.00015 - 0.034ppm	(0.00005 - 0.001)	588
			1974													P 0/4		--- ppm	(0.01 - 5)	
			1996	0/33		---	(0.2)	0/33		---	(0.026)					A 1/18		$3.3ng/m^3$	(2.5)	

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				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
589	di-n-butyl phthalate	84-74-2	1974	208/375		0.05 - 36	(0.05 - 40)	154/370		0.001 - 2.3	(0.001 - 0.28)	114/332		0.013 - 2.0	(0.01 - 0.87)	R 68/111		0.00013 - 0.052ppm	(0.0001 - 0.004)	589
			1974													P 0/4		--- ppm	(0.1 - 5)	
			1975	75/115		0.013 - 21	(0.01 - 3)													
			1982	42/45		0.06 - 1.5	(0.03 - 0.1)	39/45		0.0097 - 0.14	(0.0007 - 0.005)									
			1985													A 56/63		17 - 370ng/m3	(5 - 70)	
			1996	5/30		0.21 - 1.4	(0.2)	7/30		0.15 - 0.58	(0.14)	9/30		0.05 - 0.30	(0.04)	A 13/15		10 - 140ng/m3	(10)	
590	di-i-heptyl phthalate	41451-28-9	1974	23/375		0.12 - 1.1	(0.05 - 10)	30/350		0.008 - 6.5	(0.00005 - 1)	13/312		0.14 - 0.36	(0.00005 - 5.0)	R 22/111		0.00016 - 0.0085ppm	(0.00005 - 0.010)	590
			1974													P 0/4		--- ppm	(0.01 - 10)	
591	di-n-heptyl phthalate	3648-21-3	1982	3/45		0.2 - 0.4	(0.1 - 0.2)	7/45		0.071 - 0.30	(0.003 - 0.01)									591
			1996	0/33		---	(1)	0/33		---	(1.5)					A 3/15		10 - 17ng/m3	(6)	
592	dimethyl phthalate	131-11-3	1985	0/27		---	(0.1)	0/27		---	(0.01)									592
593	dilauryl phthalate	2432-90-8	1985	0/27		---	(2)	0/27		---	(0.1)									593
594	benzyl butyl phthalate	85-68-7	1985	0/27		---	(0.1)	2/27		0.013 - 0.016	(0.01)									594
595	o-phthalonitrile	91-15-6	1977	0/ 6		---	(1 - 5)	0/ 6		---	(0.1 - 1)									595
596	1,2-butanediol	584-03-2	1995	0/33		---	(0.2)	3/33		0.009 - 0.013	(0.0061)									596
597	1,3-butanediol	107-88-0	1986	0/24		---	(0.3)	0/24		---	(0.03)									597
598	1,4-butanediol	110-63-4	1986	0/24		---	(2)	0/24		---	(0.09)									598
599	4,4'-butylidene bis(6-tert-butyl-3-methylphenol)	85-60-9	1981	0/21		---	(0.1 - 1)	0/21		---	(0.01 - 0.06)									599
600	n-butylamine	109-73-9	1981	0/27		---	(2 - 4)	0/27		---	(0.005 - 0.04)									600
601	p-t-butylbenzoic acid	98-73-7	1985	0/33		---	(4)	6/24		0.02 - 0.05	(0.02)									601
			1986	2/105		0.2 - 0.3	(0.2)	2/138		0.02 - 0.021	(0.02)	7/108		0.005 - 0.047	(0.005)					
			1996	2/33		0.2 - 0.6	(0.2)	8/33		0.021 - 0.06	(0.02)									
602	N-tert-butyl-2-benzothiazolesulfenamide	95-31-8	1998	0/39	0/13	---	(0.1)	0/36	0/12	---	(0.0047)									602
603	6-t-butyl-2,4-xylenol	1879-09-0	1997	0/165		---	(0.5)													603
604	2-t-butyl-4-(2,4-dichloro-5-isopropoxyphenyl)-1,3,4-oxadiazoline-5-one	19666-30-9	1981	0/15		---	(0.001 - 0.2)	0/15		---	(0.001 - 0.02)									604
605	butylnaphthalenesulfonic acid	25638-17-9	1981	0/18		---	(0.5 - 15)	0/18		---	(0.025 - 3.2)									605
606	p-t-butylhydroxyphenol	1948-33-0	1980	0/42		---	(0.2 - 20)	0/42		---	(0.008 - 1.0)									606

Surveyed Chemical Substances and their Detected Levels in the Environment
(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
607	p-t-butylphenol	98-54-4	1976	0/68		---	(0.2 - 5)	0/68		---	(0.01 - 0.25)									607
			1996	0/168		---	(0.714)	0/168		---	(0.1)					A 0/18		--- ng/m3	(11)	
			1997	6/141		0.1	(0.08)	0/168		---	(0.04)									
608	2-t-butyl-4-methoxyphenol	121-00-6	1980	0/39		---	(0.03 - 10)	0/39		---	(0.0027 - 0.2)									608
609	2-butoxyethanol	111-76-2	1976	0/60		---	(90 - 100)	0/20		---	(0.4)									609
			1995	1/168		2.2	(2)	0/168		---	(0.22)									
610	1-n-butoxy-2,3-epoxypropane	2426-08-6	1984	0/24		---	(0.5 - 0.7)	0/24		---	(0.006 - 0.019)									610
611	fumaric acid	110-17-8	1983	0/24		---	(1 - 50)	0/24		---	(0.02 - 0.25)									611
612	fluorene	86-73-7	1983	0/33		---	(0.03 - 0.4)	27/33		0.003 - 0.091	(0.003 - 0.041)									612
			1984	8/138		0.07 - 2.5	(0.006 - 1)	94/138		0.0010 - 0.13	(0.0001 - 0.088)	26/138		0.001 - 0.37	(0.0003 - 0.05)					
613	diisopropyl phosphofluoridate	55-91-4	1993													A 0/48		--- ng/m3	(15)	613
614	furfural	98-01-1	1996	0/33		---	(0.4)									A 6/15		42 - 120ng/m3	(40)	614
615	1-propanol	71-23-8	1995	0/33		---	(3)	4/33		0.11 - 0.14	(0.09)					A 1/18		210ng/m^3	(200)	615
616	2-propanol	67-63-0	1995	0/33		---	(8)	4/33		0.5 - 2.64	(0.27)					A 16/18		90 - 10,000ng/m3	(50)	616
617	n-propanolamine	156-87-6	1980	0/27		---	(2.5 - 270)	0/27		---	(0.005 - 1.4)									617
618	1,2-propanediol	57-55-6	1977	0/ 6		---	(300 - 400)	0/ 6		---	(2 - 3)									618
			1986	12/24		0.2 - 0.8	(0.2)	4/24		0.020 - 0.022	(0.02)									
619	propionitrile	107-12-0	1987	0/75		---	(0.7)	0/75		---	(0.006)					A 0/61		--- ng/m3	(200)	619
620	propionaldehyde	123-38-6	1987	0/75		---	(0.5)									A 23/66		810 - 14,000ng/m3	(800)	620
621	n-propylamine	107-10-8	1980	0/27		---	(0.5 - 33)	0/27		---	(0.001 - 0.18)									621
622	propylene	115-07-1	1977	2/ 6		0.1	(0.05 - 5)	0/ 6		---	(0.0002 - 0.005)									622
623	propyleneimine	75-55-8	1986	0/30		---	(50)	0/24		---	(0.05)									623
624	propylene oxide	75-56-9	1980	0/36		---	(0.2 - 5)	0/12		---	(0.002 - 0.004)									624
			1996													A 30/46		16 - 210ng/m3	(16)	
625	2-propen-1-ol	107-18-6	1995													A 3/15		50 - 60ng/m3	(50)	625
626	o-bromoaniline	615-36-1	1984	0/18		---	(0.003 - 0.1)	0/18		---	(0.0001 - 0.012)									626
627	m-bromoaniline	591-19-5	1984	0/18		---	(0.006 - 0.1)	0/18		---	(0.0004 - 0.012)									627
628	p-bromoaniline	106-40-1	1984	0/18		---	(0.006 - 0.1)	0/18		---	(0.0004 - 0.012)									628

Surveyed Chemical Substances and their Detected Levels in the Environment
(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				#
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
629	bromochloromethane	74-97-5	1976	0/60		---	(0.2 - 1)	0/40		---	(0.005 - 0.065)	0/20		---	(0.005 - 0.01)					629
630	beta-bromostyrene	103-64-0	1985	0/30		---	(0.05)	0/30		---	(0.003)									630
631	4-bromophenyl phenyl ether	101-55-3	1984	0/27		---	(0.15 - 0.5)	0/27		---	(0.0025 - 0.12)									631
632	o-bromophenol	95-56-7	1983	0/33		---	(0.08 - 0.1)	0/33		---	(0.001 - 0.005)									632
633	m-bromophenol	591-20-8	1983	0/33		---	(0.4)	0/33		---	(0.001 - 0.02)									633
634	p-bromophenol	106-41-2	1983	0/33		---	(0.4)	5/33		0.02 - 0.03	(0.001 - 0.02)									634
			1996	0/33		---	(0.07)	0/33		---	(0.011)									
635	1-bromobutane	109-65-9	1981	0/15		---	(3)	0/15		---	(0.012 - 0.02)									635
636	1-bromopropane	106-94-5	1981	0/15		---	(2 - 3)	0/15		---	(0.009 - 0.02)									636
637	2-bromopropane	75-26-3	1997	0/36		---	(0.01)	0/36		---	(0.028)					A 0/57		--- ng/m3	(200)	637
			1998													A 0/39	0/13	--- ng/m3	(170)	
638	bromobenzene	108-86-1	1981	0/12		---	(10)	0/12		---	(0.2)									638
639	fluorobenzene	462-06-6	1984	0/27		---	(0.01 - 0.04)	0/27		---	(0.00009 - 0.0010)									639
640	basic green 4	569-64-2	1985	0/33		---	(2)	0/27		---	(0.2)									640
641	basic violet 10	81-88-9	1986	0/27		---	(0.2)	0/27		---	(0.02)									641
642	hexachloroethane	67-72-1	1976	0/60		---	(0.1 - 5)	0/40		---	(0.01 - 0.3)	0/10		---	(0.3)					642
643	alpha-hexachlorocyclohexane	319-84-6	1974	3/60		0.1	(0.1)	5/60		0.01	(0.01)	16/60		0.005 - 0.015	(0.005)					643
644	beta-hexachlorocyclohexane	319-85-7	1974	0/60		---	(0.1)	9/60		0.03 - 0.05	(0.01)	2/60		0.005 - 0.007	(0.005)					644
645	gamma-hexachlorocyclohexane	58-89-9	1974	0/60		---	(0.1)	9/60		0.01	(0.01)	2/60		0.007 - 0.013	(0.005)					645
646	delta-hexachlorocyclohexane	319-86-8	1974	0/60		---	(0.1)	4/60		0.01	(0.01)	0/60		---	(0.005)					646
647	hexachlorocyclopentadiene	77-47-4	1981	0/18		---	(0.2)	0/18		---	(0.02 - 20)									647
648	hexachlorophene	70-30-4	1981	0/33		---	(0.005 - 5)	33/33		0.005 - 0.42	(0.003)									648
			1982	0/126		---	(0.005)	45/126		0.006 - 0.500	(0.002 - 0.003)	0/126		---	(0.003)					
			1996	0/33		---	(0.05)	0/33		---	(0.015)									
649	hexachloro-1,3-butadiene	87-68-3	1981	0/18		---	(0.02)	0/18		---	(0.002 - 2)									649
650	hexachlorohexahydromethanobenzodioxathiepin oxide	115-29-7 959-98-8 33213-65-9	1982	0/39		---	(0.004 - 0.025)* (0.014 - 0.06)	0/39		---	(0.0002 - 0.001)* (0.0007 - 0.003)									650
			1992													A 0/55		--- ng/m3	(30)	

*alpha-isomer(upper part), beta-isomer(lower part)

Surveyed Chemical Substances and their Detected Levels in the Environment
(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
651	hexachlorobenzene	118-74-1	1974	0/60		---	(0.1)	0/60		---	(0.01)	4/60		0.005 - 0.007	(0.005)					651
			1975	0/390		---	(0.001 - 0.01)	37/399		0.0002 - 0.12	(0.0001 - 0.005)	110/369		0.0001 - 0.028	(0.0001 - 0.005)					
			1978	6/77		0.0016 - 0.0045	(0.0016)	63/76		0.00011 - 0.48	(0.00011)	73/75		0.0002 - 0.013	(0.00016)					
			1994													A 8/24		1.1 - 3.5ng/m3	(1)	
652	hexabromocyclododecane	25637-99-4	1987	0/75		---	(0.2)	3/69		0.02 - 0.09	(0.02)	4/66		0.01 - 0.023	(0.01)					652
653	hexabromodiphenyl ether	36483-60-0	1987	0/75		---	(0.04)	4/69		0.007 - 0.077	(0.0051)	5/75		0.0038 - 0.014	(0.002)					653
			1988	0/150		---	(0.04)	4/141		0.0045 - 0.018	(0.0035)	5/144		0.002 - 0.006	(0.002)					
654	hexabromobiphenyl	36355-01-8	1989	0/63		---	(0.05)	0/63		---	(0.008)	0/63		---	(0.01)	A 0/38		--- ng/m3	(4)	654
655	hexabromobenzene	87-82-1	1977	0/15		---	(0.04 - 0.5)	0/15		---	(0.01 - 0.17)									655
			1981	0/18		---	(0.01 - 0.1)	3/18		0.0022 - 0.0069	(0.0005 - 0.0025)									
			1982	0/126		---	(0.05)	3/126		0.0031 - 0.0043	(0.0009 - 0.005)	0/126		---	(0.005)					
656	hexamethyleneimine	111-49-9	1986	0/30		---	(5)	0/24		---	(0.03)									656
657	hexamethylene tetramine	100-97-0	1983	0/30		---	(50 - 5,000)	0/30		---	(0.3 - 14)									657
658	4-(4-hexylphenyl)-benzonitrile	41122-70-7	1985	0/27		---	(2)	0/27		---	(0.05)									658
659	hexylene glycol	107-41-5	1980	0/27		---	(2.5 - 30)	0/27		---	(0.025 - 1.4)									659
			1995	0/33		---	(0.2)	5/32		0.022 - 0.03	(0.0043)									
660	heptachlor	76-44-8	1982	0/125		---	(0.005)	14/87		0.0002 - 0.0037	(0.0002 - 0.0003)	9/110		0.001 - 0.010	(0.001)					660
			1986													A 0/73		--- ng/m3	(1.0)	
661	heptachlor epoxide	1024-57-3	1982	0/126		---	(0.005)	3/126		0.0002 - 0.0006	(0.0002 - 0.001)	28/123		0.001 - 0.006	(0.001)					661
			1986													A 0/73		--- ng/m3	(0.5)	
			1996	0/33		---	(0.05)	0/33		---	(0.021)	0/32		---	(0.005)					
662	heptanol	111-70-6	1979	0/27		---	(5 - 50)	0/27		---	(0.3 - 1)									662
663	benzidine	92-87-5	1977	0/ 6		---	(0.015)	0/ 3		---	(0.003)									663
664	benzyl alcohol	100-51-6	1985	0/33		---	(0.2)	3/24		0.010 - 0.013	(0.01)									664
665	benzaldehyde	100-52-7	1984	0/27		---	(0.5 - 4)	8/27		0.01 - 0.17	(0.01 - 0.1)									665
666	benzene	71-43-2	1977	0/ 3		---	(2)	0/ 3		---	(0.004)									666
			1985	11/19		0.02 - 0.9	(0.02)	12/18		0.0005 - 0.0036	(0.0002)									
			1986	19/112		0.03 - 2.1	(0.03)	37/98		0.0005 - 0.030	(0.0005)	37/114		0.003 - 0.088	(0.003)					
667	benzenetricarboxylic acid tris(2-ethylhexyl) ester	3319-31-1	1980	0/45		---	(0.008 - 3)	0/45		---	(0.0039 - 0.02)									667
668	benz[a]anthracene	56-55-3	1989	0/159		---	(0.1)	112/145		0.0032 - 2.1	(0.003)	1/111		0.0012	(0.001)	A 39/39		0.16 - 11.0ng/m3	(0.1)	668

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
669	1,4-benzodinitrile	623-26-7	1981	0/15		---	(0.1 - 5)	0/15		---	(0.001 - 0.05)									669
670	benzothiazole	95-16-9	1983	0/30		---	(0.1 - 0.5)	4/30		0.0016 - 0.0033	(0.0015 - 0.05)									670
671	benzothiophene	95-15-8 11095-43-5	1998	0/42	0/14	---	(0.05)	11/36	4/12	0.0023 - 0.023	(0.002)	0/42	0/14	---	(0.001)					671
672	benzonitrile	100-47-0	1977	0/ 6		---	(1 - 5)	0/ 6		---	(0.1 - 1)									672
673	benzo[a]pyrene	50-32-8	1989	0/138		---	(0.1)	122/134		0.005 - 3.7	(0.005)	1/123		0.008	(0.003)	A 31/39		0.31 - 6.37ng/m3	(0.3)	673
674	benzo[e]pyrene	192-97-2	1989	0/75		---	(0.1)	72/74		0.0009 - 1.8	(0.0008)	0/66		---	(0.003)	A 29/39		0.30 - 5.43ng/m3	(0.3)	674
675	benzophenone	119-61-9	1981	0/15		---	(0.1 - 0.2)	0/15		---	(0.02)									675
676	benzo[b]fluoranthene, benzo[j]fluoranthene, benzo[k]fluoranthene*	205-99-2 205-82-3 207-08-9	1989	0/159		---	(0.1)	118/159		0.01 - 5.5	(0.01)	1/120		0.004	(0.003)	A 36/39		0.24 - 16.83ng/m3	(0.2)	676
*Total of 3 compounds																				
677	benzo[g,h,i]perylene	191-24-2	1989	1/72		0.05	(0.05)	72/72		0.003 - 1.31	(0.003)	1/66		0.016	(0.005)	A 32/39		0.41 - 7.0ng/m3	(0.4)	677
678	pentaerythritol	115-77-5	1997	0/33		---	(0.52)	0/33		---	(0.06)									678
679	pentachloroaniline	527-20-8	1981	0/15		---	(0.0001 - 0.01)	0/15		---	(0.001 - 0.01)									679
680	pentachloroethane	76-01-7	1984	0/21		---	(0.005 - 0.04)	0/21		---	(0.00003 - 0.00050)									680
681	pentachloronitrobenzene	82-68-8	1981	0/12		---	(0.01)	0/12		---	(0.0005)									681
			1991	0/57		---	(0.42)	0/51		---	(0.039)	0/51		---	(0.035)	A 5/48		6.2 - 13ng/m3	(6)	
682	pentachlorofenol	87-86-5	1974	2/55		0.2	(0.1)	10/50		0.08 - 0.36	(0.01 - 0.05)									682
			1996	0/33		---	(0.2)	2/33		0.011 - 0.014	(0.01)									
683	pentachlorobenzene	608-93-5	1975	0/100		---	(0.01)	0/100		---	(0.01)	3/95		0.018 - 0.088	(0.01)	R 0/30		--- ppm	(0.00001)	683
			1979	0/111		---	(0.002 - 0.04)	30/111		0.0001 - 0.011	(0.00001 - 0.01)	3/98		0.001 - 0.002	(0.00001 - 0.01)					
			1994													A 9/24		1.0 - 8.0ng/m3	(1)	
684	pentabromobenzene	608-90-2	1981	0/18		---	(0.005 - 0.05)	0/18		---	(0.00005 - 0.001)									684
685	phosalone	2310-17-0	1993	0/54		---	(0.1)	0/54		---	(0.05)	0/54		---	(0.035)	A 0/24		--- ng/m3	(9)	685
686	phosmet	732-11-6	1993													A 0/24		--- ng/m3	(7)	686
687	fatty acid polyethyleneglycol ester	25322-68-3	1982	0/30		---	(10)													687
688	polychloroterphenyl	6178-33-8	1974	0/60		---	(0.01 - 1)	0/60		---	(0.005)	3/11		0.05 - 0.12	(0.05 - 0.2)					688
			1976	0/156		---	(0.01 - 1)	21/151		0.001 - 0.33	(0.001 - 0.2)	0/39		---	(0.001 - 0.2)					
			1978	0/75		---	(0.002 - 2.5)	37/75		0.001 - 4.7	(0.001 - 1.0)	3/66		0.0003 - 0.003	(0.0002 - 0.1)					

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#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
689	polychloronaphthalene	70776-03-3	1976	4/148		0.10 - 0.45	(0.02 - 2)	23/138		0.005 - 0.67	(0.004 - 0.2)	1/39		0.35	(0.005 - 0.05)					689
			1978	3/75		0.008 - 0.04	(0.001 - 1)	15/75		0.02 - 1.0	(0.005 - 0.05)	9/66		0.002 - 0.13	(0.004 - 0.025)					
			1998													A 42/42	14/14	0.011 - 0.86ng/m3	(0.001)	
690	polychlorobiphenyl	1336-36-3	1997													A 63/63		0.044 - 1.5ng/m3*	---	690
*The values are the total of the PCBs																				
691	polyoxyethylene alkyl amide		1983	0/27		---	(4)	0/27		---	(0.7)									691
692	polyoxyethylene alkyl amine		1983	0/27		---	(5)	0/27		---	(0.5)									692
693	polyoxyethylene alkyl ether	27306-79-2	1982	0/30		---	(5)	19/30		0.22 - 1.0 *	(0.2)									693
*Investigate the compounds of n=2 -8 mols of ethylene oxide and extract the value for n=3																				
694	polyoxyethylene alkylphenyl ether		1977	3/15		190 - 280	(100)	6/15		7.2 - 30	(4.0)									694
			1978	25/105		130 - 930	(100)	69/88		2.1 - 50	(2)									
			1982	1/30		90	(15)	8/30		2.6 - 4.9	(2.0)									
695	nonionic surfactant (polyoxy ethylene type)		1982	17/72		5 - 50	(3 - 10)	54/72		0.16 - 12.4	(0.1 - 0.2)									695
			1998	7/45	3/15	3.5 - 22	(3)	29/42	10/14	0.086 - 12	(0.082)									
696	polybromobiphenyl		1981	0/27		---	(0.1 - 1)	0/27		---	(0.005 - 0.01)									696
697	formic aldehyde	50-00-0	1975	0/100		---	(100 - 500)													697
			1995	0/33		---	(2)													
698	mirex	2385-85-5	1983	0/27		---	(0.01)	0/27		---	(0.0006 - 0.0024)									698
699	malathion	121-75-5	1993	0/51		---	(0.06)	0/51		---	(0.06)	0/51		---	(0.069)	A 0/54		--- ng/m3	(25)	699
700	maleic acid	110-16-7	1983	0/24		---	(1 - 50)	0/24		---	(0.05 - 0.25)									700
701	mecoprop	93-65-2	1996	0/33		---	(0.2)	0/33		---	(0.02)									701
702	methacrylic acid	79-41-4	1987	0/75		---	(6)	0/75		---	(0.14)									702
703	ethyl methacrylate	97-63-2	1979	0/24		---	(0.005 - 1)	0/24		---	(0.00010 - 0.01)									703
704	glycidyl methacrylate	106-91-2	1986	0/30		---	(0.3)	0/24		---	(0.04)									704
705	butyl methacrylate	97-88-1	1979	0/24		---	(0.005 - 1)	0/24		---	(0.00010 - 0.01)									705
706	methyl methacrylate	80-62-6	1979	0/24		---	(0.005 - 1)	0/24		---	(0.00011 - 0.01)									706
707	methacrylonitrile	126-98-7	1987	0/75		---	(0.7)	0/75		---	(0.014)					A 0/61		--- ng/m3	(40)	707
708	methanol	67-56-1	1995													A 14/18		3,100 - 49,000ng/m3	(2000)	708
709	methidathion	950-37-8	1993	0/54		---	(0.1)	0/54		---	(0.09)	0/54		---	(0.11)	A 0/24		--- ng/m3	(5)	709
710	N-methylaniline	100-61-8	1976	0/68		---	(0.08 - 0.6)	11/68		0.002 - 0.012	(0.002 - 0.008)									710
			1990	3/69		0.038 - 0.093	(0.03)	4/66		0.0078 - 0.014	(0.007)	0/69		---	(0.0027)	A 1/51		$220ng/m^3$	(150)	

Surveyed Chemical Substances and their Detected Levels in the Environment
(A Cumulative List for Fiscal Year 1974 - 1998)

#	Substance	CAS NO.	Fis. Year	Number of detection and range of detection																#
				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
711	methylamine	74-89-5	1986	0/33		---	(2)	12/21		0.046 - 0.213	(0.04)									711
712	methyl isobutyl carbinol	108-11-2	1980	0/27		---	(2.5 - 8)	0/27		---	(0.025 - 0.4)									712
713	methyl isobutyl ketone	108-10-1	1980	0/24		---	(4 - 15)	0/24		---	(0.2 - 0.6)									713
			1995	0/33		---	(1.7)	0/33		---	(0.17)					A 10/51		11,000 - 3,800ng/m3	(1,100)	
714	methyl ethyl ketone	78-93-3	1980	0/24		---	(3 - 8)	0/24		---	(0.15 - 0.4)									714
			1995	8/165		1.2 - 2.5	(1)	66/159		0.03 - 0.93	(0.028)					A35/53		500 - 1,6000ng/m3	(500)	
715	methyl ethyl ketone oxime	96-29-7	1978	0/21		---	(10 - 30)	0/18		---	(0.1 - 0.7)									715
716	2-isopropylphenyl methylcarbamate	2631-40-5	1988	0/75		---	(0.3)	0/69		---	(0.0103)					A 0/72		--- ng/m3	(7.0)	716
717	o-isopropoxyphenyl methyl carbamate	114-26-1	1988	0/75		---	(0.3)	0/69		---	(0.0103)					A 0/72		--- ng/m3	(7.0)	717
			1994	0/39		---	(0.02)	0/39		---	(0.0033)	0/39		---	(0.001)					
718	3,5-xylyl methylcarbamate	2655-14-3	1988	0/75		---	(0.22)	0/69		---	(0.0103)					A 0/72		--- ng/m3	(7.0)	718
719	m-tolyl methylcarbamate	1129-41-5	1988	0/75		---	(0.5)	0/69		---	(0.0103)					A 1/72		8.0ng/m^3	(7.0)	719
			1994	0/30		---	(0.02)	0/30		---	(0.003)	0/30		---	(0.003)					
720	1-naphthyl methylcarbamate	63-25-2	1983	0/36		---	(0.05 - 0.06)	0/36		---	(0.002 - 0.023)									720
			1988	0/69		---	(0.18)	0/69		---	(0.0205)					A 0/72		--- ng/m3	(7.0)	
721	o-s-butylphenyl methylcarbamate	3766-81-2	1988	0/75		---	(0.4)	0/69		---	(0.0103)					A 4/72		7.7 - 48ng/m3	(7.0)	721
722	methyl-N',N'-dimethyl-N-(methylcarbamoyl)oxy-1-thiooxamimidate	23135-22-0	1992	0/33		---	(0.1)	0/33		---	(0.01)	0/33		---	(0.005)					722
723	alpha-methylstyrene	98-83-9	1977	0/ 3		---	(4)	0/ 3		---	(0.01)									723
			1997	0/36		---	(0.3)	0/33		---	(0.0055)									
724	beta-methylstyrene	5013-15-4	1977	0/ 3		---	(4)	0/ 3		---	(0.01)									724
725	m-methylstyrene	100-80-1	1977	0/ 3		---	(4)	0/ 3		---	(0.01)									725
726	p-methylstyrene	622-97-9	1977	0/ 3		---	(4)	0/ 3		---	(0.01)									726
727	1-methylnaphthalene	90-12-0	1976	0/28		---	(0.2 - 1)	0/28		---	(0.02 - 0.1)									727
			1984													A 65/72		1.9 - 280ng/m3	(0.4 - 5)	
			1998													A 29/30	10/10	5.1 - 150ng/m3	(2)	
728	2-methylnaphthalene	91-57-6	1976	0/28		---	(0.2 - 1)	0/28		---	(0.02 - 0.1)									728
			1984													A 66/72		2.6 - 530ng/m3	(0.5 - 8)	
			1998													A 30/30	10/10	3.2 - 310ng/m3	(1.7)	
729	2-methyl-4-nitroaniline	99-52-5	1985	0/36		---	(0.04)	0/36		---	(0.008)									729

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				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
730	4-methyl-2-nitroaniline	119-32-4	1985	0/36		---	(0.02)	0/36		---	(0.008)									730
731	2-methylpiperidine	109-05-7	1986	0/30		---	(20)	0/24		---	(0.03)									731
732	2-methylpyridine	109-06-8	1986	0/30		---	(0.3)	7/30		0.0065 - 0.024	(0.005)									732
			1987	5/96		0.32 - 2.7	(0.2)	67/94		0.0012 - 0.108	(0.0008)	105/132		0.001 - 0.048	(0.001)					
			1994	19/162		0.10 - 2.4	(0.1)	103/147		0.0011 - 0.024	(0.0011)	106/152		0.0020 - 0.0315	(0.002)	A 46/49		1 - 77ng/m3	(1)	
	3-methylpyridine, 4-methylpyridine *	108-89-4 108-99-6	1986	0/30		---	(0.6)	6/30		0.0077 - 0.076	(0.007)									
			1987	3/93		0.2 - 0.81	(0.2)	64/94		0.0018 - 0.142	(0.0008)	59/97		0.001 - 0.169	(0.001)					
*Total of 2 compounds																				
733	3-methylpyridine	108-99-6	1994	6/165		0.29 - 0.74	(0.2)	83/135		0.0012 - 0.038	(0.0012)	53/147		0.002 - 0.012	(0.002)	A 45/49		1 - 39ng/m3	(1)	733
734	4-methylpyridine	108-89-4	1994	11/162		0.14 - 0.78	(0.1)	91/128		0.0012 - 0.051	(0.0012)	57/141		0.0014 - 0.110	(0.0014)	A 38/48		1.0 - 16ng/m3	(1)	734
735	4-methyl-3-pentene-2-one	141-79-7	1980	0/24		---	(5 - 50)	0/24		---	(0.3 - 1.0)									735
736	S-methyl-N-[(methylcarbamoyl)oxy]thioacetimidate	16752-77-5	1992	0/33		---	(0.1)	0/33		---	(0.01)	0/33		---	(0.005)					736
737	methyl mercaptan	74-93-1	1992													A 0/51		--- ng/m3	(1,000)	737
738	2-methoxyethanol	109-86-4	1976	0/60		---	(90 - 100)	0/20		---	(0.4)									738
739	2-methoxyphenol	90-05-1	1986	0/39		---	(0.2)	4/39		0.010 - 0.020	(0.01)									739
740	3-methoxyphenol	150-19-6	1986	0/39		---	(0.2)	0/39		---	(0.01)									740
741	4-methoxyphenol	150-76-5	1986	0/39		---	(0.2)	0/39		---	(0.01)									741
742	methoxybutanol	2517-43-3	1980	0/27		---	(2.5 - 10)	0/27		---	(0.025 - 0.6)									742
743	melamine	108-78-1	1986	21/30		0.1 - 1.6	(0.1)	2/30		0.088 - 0.13	(0.07)									743
			1987	89/150		0.1 - 7.6	(0.1)	36/117		0.01 - 0.32	(0.01)	13/144		0.06 - 0.55	(0.05)					
			1988									5/12		0.09 - 0.23	(0.05)					
			1994	43/150		0.11 - 6.4	(0.11)	29/160		0.015 - 0.40	(0.015)	12/148		0.020 - 0.075	(0.02)	A 12/39		2.0 - 55ng/m3	(2)	
744	2-mercaptoimidazoline	96-45-7	1983	0/33		---	(0.8 - 40)	0/33		---	(0.02 - 0.51)									744
745	2-mercaptobenzimidazole	583-39-1	1978	0/45		---	(0.25 - 50)	0/39		---	(0.017 - 2.5)									745
746	2-mercaptobenzothiazole	149-30-4	1977	3/12		0.011 - 0.021	(--- - 0.1)	2/12		0.0021 - 0.037	(0.0009 - 0.02)									746
			1978	0/117		---	(0.01 - 10)	3/111		0.046 - 0.058	(0.002 - 1.2)	0/90		---	(0.002 - 1)					
747	monoethanolamine	141-43-5	1980	0/27		---	(3 - 270)	0/27		---	(0.006 - 1.4)									747
			1994	24/156		0.55 - 2.3	(0.5)	84/147		0.010 - 0.92	(0.01)					A 9/51		13 - 160ng/m3	(12)	

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				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
748	monochloroacetic acid	79-11-8	1984	1/21		0.64	(0.2 - 1)	3/21		0.0016 - 0.0033	(0.001 - 0.01)									748
749	mono(alpha-methylbenzyl)phenol	1988-89-2	1978	0/45		---	(0.02 - 10)	0/45		---	(0.0013 - 1)									749
750	2-(morpholinothio)benzothiazole	102-77-2	1977	0/12		---	(0.02 - 0.04)	0/12		---	(0.0012 - 0.01)									750
751	morpholine	110-91-8	1979	0/33		---	(1 - 50)	0/33		---	(0.01 - 0.5)									751
			1994	9/48		0.28 - 2.51	(0.28)	25/45		0.0024 - 0.051	(0.0024)	0/48		---	(0.03)	A 0/51		--- ng/m3	(20)	
752	organic silicon compounds		1979	0/120		---	(10)	21/120		2.1 - 19.2	(2.0)									752
			1980	0/120		---	(2.5)	68/120		1.0 - 70	(1.0)	89/108		1.0 - 16	(1.0)					
753	organic tin compounds		1975	0/80		---	(10 - 25)													753
754	methyl iodide	74-88-4	1980													A 4/27		0.020 - 0.066ppb	(0.001 - 0.02)	754
755	cresyl diphenyl phosphate	26444-49-5	1981	0/63		---	(0.05)	0/63		---	(0.005)									755
756	phosphoric acid, 2-chloro-1-(2,4-dichlorophenyl)vinyl diethyl ester *	470-90-6	1988	0/72		---	(0.2)	6/57		0.006 - 0.02	(0.006)	0/72		---	(0.005)	A 0/72		--- ng/m3	(20)	756
			1993	0/51		---	(0.37)	0/51		---	(0.063)	0/51		---	(0.046)					
			1993	0/51		---	(0.15)	0/51		---	(0.03)	0/51		---	(0.039)					
*alpher-isomer(upper part), beta-isomer(lower part) in 1993																				
757	diethyl-p-nitrophenyl phosphate	311-45-5	1993	0/75		---	(0.2)	0/75		---	(0.03)	0/75		---	(0.05)					757
758	2,2-dichloro-1,2-dibromoethyl dimethyl phosphate	300-76-5	1984	0/24		---	(0.5 - 2)	0/24		---	(0.03 - 0.26)									758
759	2,2-dichlorovinyl alcohol dimethyl phosphate	62-73-7	1983	0/30		---	(0.1)	0/30		---	(0.005 - 0.031)									759
			1993													A 4/51		10 - 13ng/m3	(10)	
760	O,O-dimethyl-O-2-chloro-1-(2,4,5-trichlorophenyl)ethenyl phosphate	961-11-5	1988	0/72		---	(0.5)	0/72		---	(0.0103)	0/72		---	(0.02)	A 0/72		--- ng/m3	(20)	760
761	triethyl phosphate	78-40-0	1982	0/42		---	(0.005 - 0.1)	0/42		---	(0.00025 - 0.005)									761
762	trioctyl phosphate	1806-54-8	1975	0/100		---	(0.04 - 0.50)	3/100		0.02 - 0.100	(0.005 - 0.10)	0/94		---	(0.01 - 0.10)					762
763	trixylenyl phosphate	25155-23-1	1981	0/63		---	(0.2)	13/63		0.07 - 3.7	(0.05)									763

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				Water(ng/ml)				Sediment(ug/g-dry)				Fishes(ug/g-wet)				Others A:Air; R:Rain Water; P:Plankton				
				A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	A/B	C/D	Range of detection	Limit of detection	
764	tricresyl phosphate	1330-78-5	1975	0/100		---	(0.05 - 1.5)	1/100		0.15	(0.01 - 0.25)	0/96		---	(0.02 - 0.25)					764
			1978	0/114		---	(0.005 - 2.5)	2/114		1.06 - 2.16	(0.00025 - 0.3)	0/93		---	(0.00025 - 0.15)					
			1993	0/72		---	(0.05)	50/72		0.003 - 0.24	(0.003)	2/75		0.063 - 0.082	(0.022)	A 7/42		3 - 17ng/m3	(3)	
			1998													A 8/46	5/16	1.2 - 2.6ng/m3	(1)	
765	tris(isopropylphenyl)phosphate	26967-76-0	1978	0/24		---	(0.05 - 2)	3/24		0.1	(0.01 - 0.1)									765
766	tris(2-ethylhexyl)phosphate	78-42-2	1981	0/63		---	(0.01)	43/63		0.002 - 0.07	(0.001 - 0.005)									766
767	tris(2-chloroethyl) phosphate	115-96-8	1975	8/40		0.1 - 0.34	(0.013 - 0.1)	1/20		0.070	(0.025)	0/20		---	(0.025)					767
			1978	3/114		0.09	(0.01 - 1)	0/114		---	(0.001 - 0.05)	9/93		0.005 - 0.14	(0.001 - 0.05)					
			1993	36/70		0.05 - 1.2	(0.05)	22/72		0.005 - 0.085	(0.005)	9/75		0.012 - 0.29	(0.012)	A 21/39		1 - 7.4ng/m3	(1)	
			1998													A 24/37	12/15	0.29 - 1.4ng/m3	(0.24)	
768	tris(2-chloropropyl)phosphate	6145-73-9	1984	0/24		---	(0.05 - 1)	0/24		---	(0.011 - 0.05)									768
769	tris(1,3-dichloro-2-propyl)phosphate	13674-87-8	1975	0/100		---	(0.02 - 0.25)	0/100		---	(0.002 - 0.05)	7/94		0.015 - 0.025	(0.005 - 0.05)					769
			1978	0/114		---	(0.001 - 0.5)	0/114		---	(0.0001 - 0.06)	0/93		---	(0.001 - 0.03)					
			1984	0/24		---	(0.25 - 1)	0/24		---	(0.03 - 0.06)									
770	tris(dibromopropyl)phosphate	126-72-7	1975	0/114		---	(1)	0/114		---	(0.4 - 10)	0/20		---	(1)					770
771	tris(butoxyethyl) phosphate	78-51-3	1975	0/100		---	(0.02 - 0.5)	7/80		0.22 - 0.54	(0.002 - 0.10)	0/74		---	(0.005 - 0.10)					771
			1978	0/114		---	(0.005 - 1.5)	0/114		---	(0.0005 - 0.12)	0/93		---	(0.0005 - 0.15)					
			1993	12/165		0.51 - 2.8	(0.5)	0/168		---	(0.098)	1/156		0.1	(0.1)	A 2/48		50 - 100ng/m3	(50)	
772	tris(2-bromoethyl)phosphate	27568-90-7	1984	0/24		---	(0.13 - 1)	0/24		---	(0.027 - 0.07)									772
773	triphenyl phosphate	115-86-6	1975	0/100		---	(0.02 - 0.2)	0/100		---	(0.002 - 0.05)	0/100		---	(0.005 - 0.05)					773
774	tributyl phosphate	126-73-8	1975	16/100		0.02 - 0.71	(0.01 - 0.1)	34/100		0.001 - 0.35	(0.001 - 0.025)	31/94		0.003 - 0.026	(0.002 - 0.0025)					774
			1977	39/117		0.006 - 0.58	(0.006 - 0.5)	48/117		0.0019 - 0.24	(0.001 - 0.17)	27/85		0.0011 - 0.0093	(0.001 - 0.12)					
			1993	66/148		0.011 - 0.26	(0.011)	51/159		0.002 - 0.13	(0.002)	4/150		0.006 - 0.017	(0.005)	A 9/39		1.2 - 45ng/m3	(1)	
			1998													A 29/40	13/15	0.22 - 7.5ng/m3	(0.2)	
775	trimethyl phosphate	512-56-1	1982	0/42		---	(0.02 - 0.1)	0/42		---	(0.0005 - 0.005)									775
			1984	0/24		---	(0.04 - 1)	0/24		---	(0.003 - 0.05)									

Appendix C

Suggestion of Sampling Method for Environmental Surveys Concerning Chemical Substances

Appendix C　Suggestion of Sampling Method for Environmental Surveys Concerning Chemical Substances

○ Environmental Survey (Water)

1. Sampling method

(1) Water

①Sampling time

The time for water sampling should be chosen when relatively sunny days have continued before the day of sampling and the water quality is stable.

② Sampling depth

The location for sampling should be in principle the surface water (0-50cm from the surface) in the center line of system of the surveyed point. However, water 1-2cm in depth should be avoided for sampling so that floating garbage and oils are not mixed in the samples.

③Preparation for analyzing

Supernatant removing garbage etc. should be used. In doing so, take care not to include the surface water. No filtration or centrifugal separation etc. is conducted.

(2) Bottom sediments

① Bottom sampling method

With consideration for the properties of bottom sediments, the bottom sediments collected with the Ekman-Birge bottom sampler or other proportionate bottom samplers should be placed in a clean tray and after removing extraneous substances such as pebbles, shells and bits of animals and plants, it should be provided to analysis after seaving with a 16-mesh seave (hole diameter 1mm). The sludge content (weight of sample through the seave / weight of original sample) (%) should be measured. Dry weight (105-110℃ for about 2 hours) and ignition loss (600±25℃ for about 2 hours) should be measured for part of the samples.

② Other points

Samples for analysis should in principle not be air or heat dried, and the measured value per dry weight should be calculated.

(3) Wildlife

① Samples

Samples should be fishes reproduced at the place of survey. In the sea areas, sea bass or young sea bass (if not available, goby, striped mullet or flatfish would do), and in the lakes, marshes and rivers, dace should be used (if not available, then carp or crusian carp would do) as standard samples. It would be desirable to use a single body for the samples, but use of several bodies is also possible. However, small body one should be used after sufficient cleansing.

② Preparation for analyzing

(a) Fishes

Edible parts (muscles) should be used in fish samples. The part to be collected for samples does not matter, but more than approximately 100 g should be carved and homogenized for samples. In case of the fish that its body weight is under 100 g, edible parts of several fishes should be carved and homogenized. In case of small fishes, the quantity of 100 g should be collected by carving the muscles from several bodies and homogenized.

(b) Shellfishes (in the case when fishes are not available)

In shellfishes, edible parts of the necessary quantity should be collected and homogenized for use as samples. In this case, sludge should be removed as much as possible.

③ Other points

For wildlife samples, lipid weight (%) should be calculated by the following method. Take 5g of the sample in a homogenizer cup, add 20 ml chloroform and 40 ml methanol and homogenize for 2 minutes. Further add 20 ml chloroform and homogenize for 2 minutes. Filter with buchner funnel and precipitate should be homogenized with 80 ml chloroform:methanol (1:1). Take the whole chloroform and methanol fraction into the separatory funnel, and add 60 ml distilled water and shake slowly. Collect the lower chloroform fraction and after drying using anhydrous sodium sulfate, evaporate the solvent using rotary evaporator and dry the residue using phosphorus pentoxide and measure weight.

2. Hints for sampling

(1) The primary purpose of this survey is to investigate chemical substances persisting in the environment, and make sure whether they persist more in the environment than usual. Thus points where surveyed chemical substances are being released (for example near the outlet for waste water of factories etc. where the substances are being manufactured or used, or near points where transportation facilities pass through etc.) and points directly affected by pollution should be avoided as points for sampling.

(2) Three samples should be collected in a range of 500 square meters as a unit in the survey for water and bottom sediments, so that they are collected in as wide spread a point as possible. In this case, sampling in bottom sediments should be a mixture of samples in 3 spots in equal quantities within the surrounding 50 m. In surveys for fishes, a collection of 3 samples in the point is sufficient (It will be desirable to collect extras for frozen preservation in case problems arise.).

3. Investigation items on the samples

(1) Water samples : temperature, color by observation of the eye, transparency and turbidity

(2) Bottom sediment samples: appearance, odor, foreign substance, depth of the water at sampling point, water content, ignition loss and sludge content
(3) Wildlife samples: standard Japanese vernacular name, length of body (excluding tail), body weight and lipid weight.

4. Storage etc. of Samples

Collected samples should be placed in bags or containers so that the samples would not elute or adsorb, and should be analyzed as soon as possible. When preserving them, they should be placed in refrigerators or freezers etc. to prevent change in quality.

○ Environmental Survey (Air)

1. Sampling method

①Sampling time

Sampling should take place between September and November when the weather is stable, for 3 continuous days, once a day, beginning at 10 am in principle for 24 hours.

②Sampling method

Samples should be collected by adsorption to resin or glass fiber filter etc.

2 . Hints for sampling

The points for sampling should be where the situation of air in the points can be grasped, and points strongly affected by a particular source or by transportation facilities etc. should be avoided.

3. Investigation items on the sampling

Weather, temperature, humidity, direction of the wind, velocity of the wind and surrounding geography and situation of roads at the sampling time

4. Storage etc. of samples

Follow the case for environmental survey (water).

Appendix D

Summary of Analytical Method in Environmental Survey

Appendix D Summary of Analytical Method in Environmental Survey

Substances subject to environmental survey for water system

Name of Substances	Analytical Method / Flow Sheet	Remarks
① (1)Dibutyltin comp'ds (2)Phenyltin comp'ds (3)Diphenyltin comp'ds	Water Sample 1L (NaCl 30g, pH5) — Derivatization (NaBEt$_4$) — Extraction (Hexane 100,50ml) — Dehydration/Concentration (0.2ml) — GC/MS-SIM Bottom Sediments Sample 2g (Surrogate substances) — Extraction (1M HCl-MeOH /AcEt(1:1) 20ml, 20ml) — Derivatization (pH5 NaBEt$_4$) — Extraction (Hexane 5ml, 5ml) — Dehydration/Concentration (ca. 1ml) — Clean-up (Flosil Column Cartridge) — Concentration (0.2ml) — GC/MS-SIM (Developed by Kitakyusyu City)	GC/MS-SIM Column: DB-5ms Column length: 30m Column I.D. : 0.25mm Film thickness: 0.25 μ m Detection limit Water: μ g/l (1) 0.00042 (2) 0.0055 (3) 0.00025 Bottom sediments: μ g/g (1) 0.0014 (2) 0.016 (3) 0.00017
② (4)Aniline (5)4-Ethoxyaniline (6)o-Chloroaniline (7)m-Chloroaniline (8)p-Chloroaniline (9)2,4-Dichloroaniline (10)2,5-Dichloroaniline (11)3,4-Dichloroaniline (12)o-Toluidine (13)m-Toluidine (14)p-Toluidine	Water Sample 500ml (Surrogate Aniline-d$_5$ 100ppm,10 μ l) — * Solid Phase Extraction (Sep-Pak Plus PS-2) — Elute (AcMt 3ml) — Concentration (N$_4$ ～1ml) — Add Internal St'd (Naphthalene-d$_8$, Acenaphthene-d$_{10}$, Phenanthrene-d$_{10}$, 1ppm each/Hex 1ml) — Dehydration (anhydrous Na_2SO_4 3g) — GC/MS-SIM Bottom sediments Sample 20g (Surrogate Aniline-d$_5$ 100ppm, 10 μ l) — Steam distillation (Sampling 500ml) — continue on * (Developed by Osaka Pref.)	GC/MS-SIM Column: HP-20M Column length: 25m Column I.D.: 0.2mm Film thickness: 0.2 μ m Detection limit Water: μ g/l (4) 0.059 (5) 0.249 (6) 0.088 (7) 0.107 (8) 0.066 (9) 0.067 (10) 0.062 (11) 0.084 (12) 0.061 (13) 0.145 (14) 0.081 Bottom sediments: μ g/g (4) - (5) 5.3 (6) 4.5 (7) 4.4 (8) 4.6 (9) 3.5 (10) 1.9 (11) 5.0 (12) 2.0 (13) 3.7 (14) 3.0

Name of Substances	Analytical Method / Flow Sheet	Remarks
③ (15)Acrylamide	Water Sample 500ml * → Filtration (Glass filter) → Solid state extraction (Sep-pak AC-2 (Precolumn: Sep-Pak C_{18})) → Elute (Methanol 5ml) → Derivatizat'n (10%Xanthydrol /MeOH Soln: 100 μ l) → Solvent extract'on (Dichloromethane 20ml, 20ml) → Dehydrat'n (anhydrous Na_2SO_4) → Concentrat'n (Rotary evapo-rater(<35℃)) → Const. Volume (1ml (add internal Stand'd)) → GC/MS-SIM Bottom sediments Sample 20g → Water extract'n (Pure water: 150ml (Ultrasonic extract'n 15min)) → Centrifuge (2,500rpm 10min) → continue on * (Developed by Aichi Pref.)	GC/MS-SIM Column: DB-5ms Column length: 30m Column I.D. : 0.25mm Film thickness: 0.25 μ m Detection limit Water: 0.12 μ g/l Bottom sediments: 4.0 μ g/kg
④ (16)Pyridine	Water Sample 500ml (Pyridine-d_5) * → Solid Phase Extraction (Bond Elut C8, AC-2) → Elute (Acetone Dichloro-methane 5ml Backflush) → Dehydration (anhydrous Na_2SO_4) → Concentration (1ml N_2 , <35℃) → GC/MS-SIM (Pyridine:m/z=52,79 Pyridine-d_5 :m/z=84) Bottom sediments Sample 20g (Pyridine-d_5) → Extraction (Pure water 50ml×2 Shaking 10min Ultrasonic 10min) → Centrifuge (2,800rpm 10min) → continue on * (Developed by Nagano Pref.)	GC-MS Column: HP INOWAX Column length: 30m Column I.D.: 0.32mm Film thickness: 0.5 μ m Detection limit Water: 90ng/l Bottom sediments: 4.5 ng/g

Name of Substances	Analytical Method / Flow Sheet	Remarks
⑤ (17)N,N-Dimethyl-formamide	Water Sample 500ml —* Add DMF-d_7 1μg — Solid state extraction AC-2 Cartridge — Elute Methanol 3ml — — Concentrat'n — (Ethyl acetate) — Dehydrat'n Anhydrous Na_2SO_4 — Concentrat'n — GC/MS Bottom sediments Sample 20g — Add DMF-d_7 — Ultrasonic extract'n Pure water: 30ml 15min — Centrfuge 2,500rpm 5 min (repeat 3 times) — — continue on * (Developed by Niigata Pref.)	GC/MS-SIM Column: DB-WAX Column length: 30m Column I.D. : 0.25mm Film thickness: 0.5μm Detection limit Water: 0.065μg/l Bottom sediments: 1.89μg/kg
⑥ (18)N-t-Butyl-2-benzothiazolsulfenamide (19)N-Cyclohexyl-2-benzothiazol-sulfenamide (20)N,N-Dicyclohexyl-2-benzothiazol-sulfenamide	Water Sample 1L — Extraction Hexane 50ml×2 — Concentrat'n — GC/MS-SIM Bottom sediments Sample 10g — Extract'n Acetone 50ml×2 — Extract'n Pure water 500ml Hexane 50ml×2 — Concentrat'n — — Hexane/Acetonitril Partition — Extract'n Pure water 500ml Hexane 50ml×2 — Concentrat'n — — 5%Hydrated silica gel chromatography purge 1%Acetone-Hexane 0-55ml collect 1%Acetone-Hexane 55-95ml — Concentration — GC/MS-SIM (Developed by Tokyo Metro.)	GC/MS-SIM Column: DB-1 Column length: 30m Column I.D.: 0.25mm Film thickness: 0.1μm Detection limit Water: μg/l (18) 0.086 (19) 0.21 (20) 0.26 Bottom sediments: μg/kg (18) 2.31 (19) 4.97 (20) 3.20

Name of Substances	Analytical Method / Flow Sheet	Remarks
⑦ (20)Benzothiophene (21)Dibenzothiophene	Water [Sample 1L] — [Solvent Extract'n] — [Dehydrat'n Concentrat'n] — [Sep Pak Plus] Sample 1L: NaCl 30g (no sea water) Solvent Extract'n: Acetone 50ml, Hexane 100, 50ml Dehydrat'n Concentrat'n: anhydrous Na_2SO_4 Sep Pak Plus: Silica gel, 1%Acetone-Hexane 10ml — [Concentrat'n] — [GC/MS] Bottom sediments / Wildlife [Sample 20g] — [Alkali decomposit'n] — [Standing to cool] Alkali decomposit'n: 1N KOH/EtOH 50ml, Heating/reflux (Bottom 1hr), Room temp. decomp.(Wildlife 15hr) Standing to cool: Hexane 50ml — [Extraction] — [Washing] — [Dehydrat'n/Concentrat'n] Extraction: Hexane:Ethanol(1:1)20ml, Pure water :50ml after Ex., Hexane 50ml re-Ex Washing: Pure water 50, 25ml — [Column chromatography] — [Concentrat'n] — [GC/MS] Column chromatography: 5%Hydrated Silica gel (5g,10mm φ), 1st Hexane 15ml, 2nd 1%Acetone-Hexane 100ml (Developed by Okayama Pref.)	GC-MS Column: Quadrex MS Column length: 25m Column I.D. : 0.25mm Film thickness: 0.25 μ m Column: DB-5MS Column length: 30m Column I.D.: 0.25mm Film thickness: 0.25 μ m Detection limit water: μ g/l (21) 0.040 (22) 0.01640 bottom sediments: μ g/kg (21) 1.9 (22) 2.1 fishes: μ g/kg (21) 0.61 (22) 0.34
⑧ (23)Nonionic surfactants	Water [Sample 1L] — [Solvent Extract'n /Dehydrat'n] — [Concentrat'n /Solution] * Sample 1L: NaCl 100g (No sea water) Solvent Extract'n /Dehydrat'n: EtAc 120, 100ml, Anhydrous Na_2SO_4 Concentrat'n /Solution: Water:MeOH(1:1) 10ml — [Cleanup] — [React'n w. HBr] Cleanup: Sep Pak CM-QMA-C_{18}, 1)Washing:MeOH 20ml, 2)Add sample, adsorb on C_{18}, 3)Elut'n: MeOH 4ml React'n w. HBr: 1)Evaporat'n to dryness, 2)HBr:MeOH(1:1) 0.5ml, 3)2hr reaction at 150℃ in hard ampoule — [Solvent Extract'n] — [GC/MS] Solvent Extract'n: Hexane 1 to 10ml Internal Standard(p-Xylene d_{10}) Bottom sediments [Sample 20g] — [MeOH Extract'n] — [Hexane wash] — [Filtrat'n] MeOH Extract'n: MeOH 40ml×2, Centrifuge (3,000rpm, 5min) Hexane wash: n-Hexane 30ml×2, Pure water 70ml add Filtrat'n: GF/F — continue on * (Developed by Okayama Pref.)	GC-MS Column: VOCOL Column length: 60m Column I.D.: 0.75mm Film thickness: 1.5 μ m Detection limit Water: 2.5 μ g/l Bottom sediments: 38 μ g/kg

Name of Substances	Analytical Method / Flow Sheet	Remarks
⑨ (24)Phenol	Water * Sample 1L — Adjust to pH3 — Extraction Add surrogate; NaCl (15g) / 6M HCl / Dichloromethane 100ml×2 — Dehydrat'n/Concentrat'n/Transfer to solvent — Derivatizat'n 2-Propanol (1ml) / PFBB Sol'n(2ml), K_2CO_3, 3mg, 80℃, 30min — Water wash — Concentrat'n — Cleanup — GC/MS-SIM Hexane(10ml), Pure water(30ml) / Omission allowed for hindering materials exist less / Phenanthrene-d_{10} Bottom sediments Sample 10g — Extraction — Washing Add surrogate / 0.1M NaOH/MeOH (30ml)×2 / Pure water(500ml), Dichloromethane(50ml) — Continue on * , after adding 15g NaCl Wildlife Sample 2g — Extraction — MeOH/Hexane Partition Add surrogate / MeOH(50ml) ×2 / Pure water(3ml), Hexane(10ml)×2 — Dilution — Continue on * 3%NaCl Sol'n(500ml) (Developed by Kita- Kyushu City)	GC-MS-SIM Column: DB-1701 Column length: 30m Column I.D. : 0.25mm Film thickness: 0.25 μ m Detection limit Water: 0.028 ng/ml Bottom sediments: 0.00535 μ g/g Wildlife: 0.0187 μ g/g

Substances subject to environmental survey for air system

Name of Substances	Analytical Method / Flow Sheet	Remarks
① (1)Methyl bromide (2)Ethyl bromide (3)Vinyl chloride (4)1,2-Dibromoethane (5)2-Bromopropane (6)1-Chlorobutane (7)3,4-Dichloro-1-butane (8)Toluene (9)Chlorobenzene (10)o-Xylene (11)m-Xylene+p-Xylene (12)Styrene (13)Dichloromethane (14)1,2,4-Trimethyl-benzene (15)1,3,5-Trimethyl-benzene	Air Sample — Canister Collection — Concentrat'n — Pressurize/ Dilution Canister Collection: Canister(6L), 24hr continuous sampling, 3.5ml/min(vacuum), 8.0ml/min(pressurized) Pressurize/ Dilution: Wet high purity N_2, 200kpa — Concentrat'n/Introduct'n — GC/MS-SIM or GC/MS-Scan Concentrat'n/Introduct'n: Canister Sample Analysis system (Developed by Kanagawa Pref.)	Canister collection GC/MS-SIM or GC/MS-Scan Column: HP-1 or SPB-1 Column length: 60m Column I.D. : 0.32mm Film thickness: 1.0μm Detection limit: μg/m3 (1) 0.023 (2) 0.026 (3) 0.017 (4) 0.041 (5) 0.028 (6) 0.020 (7) 0.063 (8) 0.040 (9) 0.023 (10) 0.036 (11) 0.036 (12) 0.033 (13) 0.020 (14) 0.055 (15) 0.033
② (16)Polychlorinated naphthalene	Air sample (High volume air sampler) Quarzfilter(QMF): Soxlet Extract'n (Acetone 24hr) — Hexane Transfer — H_2SO_4 Wash — Column cleanup — GC/MS-SIM Polyurethene foam(PUF): Soxlet Extract'n (Hexane 24hr) — H_2SO_4 Wash — Column cleanup — GC/MS-SIM (Developed by Hyogo Pref.)	GC-MS/SIM Column: Ultra 2 Column length: 25m Column I.D.: 0.20mm Film thickness: 0.33μm Detection limit (ng/m3) Monochlorides: 0.01 Dichlorides: 0.04 Trichlorides: 0.04 Tetrachlorides: 0.03 Pentachlorides: 0.1 Hexachlorides: 0.1 Heptachlorides: 0.1 Octachlorides: 0.2
③ (17)Tris(2-chloroethyl) phosphate (18)Tributyl phpsphate (19)Tricresyl phosphate (20)Bis(2-Ethylhexyl) adipate	Air sample (15m3) — Collection (Quarz fiber filter +Activated carbon fiber filter) — Ultrasonic extract'n (Acetone w. 30%Toluene) — Cleanup (Sep Pak Silica) — GC/MS-SIM (Developed by Kawasaki City)	GC/MS-SIM Column: SPB-1 Column length: 30m Column I.D.: 0.32mm Film thickness: 0.25μm Detection limit (μg/m3) (17) 0.35 (18) 0.30 (19) 0.82 (20) 1.11

Name of Substances	Analytical Method / Flow Sheet	Remarks
③ (21-1)1-Methyl-naphthalene (21-2)2-Methyl-naphthalene (22-1)1,2-Dimethyl-naphthalene (22-2)1,3-+1,6-Di-methylnaphthalene (22-3)1,4-Dimethyl-naphthalene (22-4)1,5-Dimethyl-naphthalene (22-5)1,7-Dimethyl-naphthalene (22-6)1,8-Dimethyl-naphthalene (22-7)2,3-Dimethyl-benzene (22-8)2,6-Dimethyl-naphthalene (22-9)2,7-Dimethyl-naphthalene	Air Sample 40L — Adsorption Collection Tenax TA 50mg — H_2SO_4washing TCT — GC-MS-SIM (Developed by Kawasaki City)	GC/MS-SIM Column: SPB-50 Column length: 30m Column I.D.: 0.32mm Film thickness: 0.25 μ m Detection limit: μ g/m3 (21-1) 0.15 (21-2) 0.41 (22-1) 0.10 (22-2) 0.15 (22-3) 0.10 (22-4) 0.08 (22-5) 0.10 (22-6) 0.08 (22-7) 0.10 (22-8) 0.13 (22-9) 0.12
④ (23)Crotonaldehyde	DNHPSilica Cartridge Collection Ozone scrubber, 2 in parallel, warmed — Solvent Removal TOYOPAK IC-SP Acetonitrile — Evaporation to dryness RE — Re-dissolut'n EtAC 100 μ g/l 0.1 ppm Decanonitrile — GC/MS (Developed by Osaka City)	GC-MS Column: DB-5 Column length: 30m Column I.D.: 0.32mm Film thickness: 0.25 μ m Detection limit 0.004 μ g/m3

Appendix E

Trend of Major Pollutant Levels in Wildlife Monitoring

(Fiscal Year 1978-1998)

Appendix E

Trend of Major Pollutant Levels in Wildlife Monitoring (Fiscal Year 1978–1998)

Table E-1　PCB (Fiscal Year 1978-98)

(Fishes)

(Unit: ppm)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Offshore of Kushiro, Hokkaido	Chum salmon	Average	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Nemuro, Hokkaido	Angry rockfish	Average	0.03	0.03	0.02	—	—	—	—	—	—	—	0.04	0.05	0.02	0.05	0.06	0.11	0.04	0.05	0.02	0.03	0.01
		Max.	0.05	0.04	0.04	nd	nd	nd	nd	nd	0.01	0.03	0.06	0.08	0.04	0.06	0.08	0.12	0.04	0.06	0.03	0.04	0.02
		Min.	0.01	0.02	0.01	nd	nd	nd	nd	nd	nd	nd	0.03	0.03	0.02	0.03	0.04	0.07	0.03	0.04	0.02	0.02	0.01
Yamada Bay, Iwate Pref.	Greenling	Average			—	—	—	—	—	—	—	0.02	—	—	—	—	—	—	—	—	—	0.05	—
		Max.			nd	0.02	0.02	0.03	tr	tr	0.02	0.03	tr	tr	0.01	tr	0.01	tr	0.01	tr	0.01	0.10	nd
		Min.			nd	nd	nd	nd	tr	nd	tr	0.02	nd	nd	tr	nd	nd	nd	nd	nd	tr	0.01	nd
Offshore of Joban	Pacific saury	Average	0.02	0.01	—	—	—	—	—	—	—	0.14	0.01	—	—	—	—	—	—	—	—	—	—
		Max.	0.02	0.01	0.01	nd	nd	nd	nd	nd	tr	0.25	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.	0.01	0.01	nd	nd	nd	nd	nd	nd	tr	0.07	0.01	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Tohoku, Sea of Japan	Cod	Average			—	—	—	—	—	—	—	—	0.02	0.02	—	—	—	—	—	—	—	—	—
		Max.			0.01	0.02	nd	nd	nd	nd	nd	0.02	0.04	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.			nd	nd	nd	nd	nd	nd	nd	tr	0.01	0.02	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tokyo Bay	Sea bass	Average	0.34	0.42	0.28	0.75	0.31	0.12	0.11	0.09	0.06	0.15	0.20	0.39	0.13	0.63	0.26	0.25	0.22	0.06	0.12	0.26	0.14
		Max.	0.50	0.50	0.60	1.03	0.37	0.15	0.15	0.10	0.08	0.18	0.27	0.56	0.17	0.77	0.38	0.29	0.27	0.08	0.14	0.37	0.16
		Min.	0.20	0.40	0.10	0.48	0.23	0.08	0.07	0.08	0.05	0.12	0.12	0.29	0.07	0.55	0.16	0.21	0.18	0.04	0.08	0.21	0.13
Osaka Bay	Sea bass	Average			0.68	1.30	0.08	0.62	0.58	0.18	0.15	0.21	0.12	0.48	0.59	0.25	0.47	0.55	0.24	0.19	0.27	0.23	0.25
		Max.			1.00	1.80	1.10	0.70	0.77	0.19	0.23	0.40	0.15	0.57	0.73	0.39	0.53	0.87	0.33	0.24	0.35	0.28	0.29
		Min.			0.20	1.10	0.30	0.43	0.26	0.15	0.09	0.13	0.08	0.40	0.41	0.11	0.42	0.15	0.19	0.14	0.21	0.18	0.20
Seto Inland Sea	Sea bass	Average		0.68	0.32	0.18	1.33	0.49	0.68	0.87	0.46	0.20	0.35	0.09			0.07	0.11	0.04	0.06	0.21	0.07	0.04
		Max.		0.70	0.50	0.50	2.10	0.99	1.00	1.40	1.00	0.37	0.53	0.13			0.09	0.20	0.05	0.11	0.45	0.10	0.04
		Min.		0.60	0.10	0.04	0.27	0.13	0.34	0.57	0.10	0.14	0.13	0.02			0.04	0.03	0.02	0.02	0.03	0.04	0.03
Offshore of Sanin	Sea bass	Average					0.17	0.12	0.13	0.09	0.07	0.07	0.12	0.08	0.06	0.06	0.08	0.09	0.03	0.02	0.02	0.04	0.03
		Max.					0.23	0.22	0.16	0.12	0.12	0.13	0.13	0.09	0.06	0.06	0.09	0.11	0.03	0.03	0.03	0.05	0.03
		Min.					0.14	0.05	0.09	0.06	0.05	0.05	0.10	0.06	0.05	0.05	0.06	0.07	0.03	0.01	0.02	0.03	0.02
Mouth of the Riv. Shimanto	Sea bass	Average							0.28	0.12	0.04	0.08	—	—	0.10	—	—	—	—	—	—	—	—
		Max.							0.65	0.28	0.08	0.16	0.02	0.02	0.17	0.02	tr	0.04	tr	tr	0.01	0.03	nd
		Min.							0.07	0.06	0.01	0.03	tr	tr	0.05	tr	tr	nd	tr	tr	nd	tr	nd
Surrouding of Shugen Island	Sea bass	Average													0.03	0.06	0.02	—	0.03	—	0.02	0.05	—
		Max.													0.04	0.13	0.03	0.01	0.04	0.04	0.03	0.07	0.02
		Min.													0.01	0.04	0.01	tr	0.02	nd	0.02	0.04	tr
West Coast of Satsuma Peninsula	Sea bass	Average							0.04	0.12	0.04	0.04	0.02	0.03	0.01	—	—	—	—	—	0.02	—	0.03
		Max.							0.09	0.19	0.05	0.06	0.04	0.05	0.01	0.02	tr	0.01	0.01	0.01	0.03	0.02	0.04
		Min.							0.02	0.06	0.03	0.03	0.01	0.02	0.01	tr	tr	tr	tr	tr	0.01	tr	0.02
Nakagusuku Bay Okinawa Pref.	Black porgy	Average										—	—	—	—	—	—	—	—	—	—	—	—
		Max.										nd	nd	nd	nd	nd	0.01	0.01	nd	nd	0.01	nd	nd
		Min.										nd	nd	nd	nd	nd	tr	tr	nd	nd	nd	nd	nd
Lake Biwa, Shiga Pref.	Dace	Average		0.08	0.05	0.05	0.03	0.05	0.02	0.11	0.04	0.02	0.04	0.05	0.07	0.06	0.04	0.03	0.04	0.01	0.03	0.04	0.05
		Max.		0.10	0.08	0.07	0.03	0.07	0.02	0.13	0.05	0.03	0.04	0.07	0.08	0.08	0.07	0.04	0.04	0.02	0.03	0.05	0.05
		Min.		0.06	0.04	0.05	0.02	0.03	0.01	0.09	0.03	0.02	0.03	0.04	0.05	0.04	0.03	0.03	0.04	0.01	0.03	0.03	0.04

(Shellfishes)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Yamada Bay, Iwate Pref.	Common mussel	Average	0.01	0.02	0.01	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.	0.01	0.02	0.01	nd	0.01	tr	tr	nd	tr	tr	tr	tr	nd	nd	tr	tr	nd	nd	nd	tr	nd
		Min.	0.01	0.01	0.01	nd	nd	nd	tr	nd	tr	tr	tr	nd	nd	nd	tr	nd	nd	nd	nd	tr	nd
Miura Peninsula, Kanagawa Pref.	Common mussel	Average	0.07	0.07	0.03	0.06	0.04	0.05	0.03	0.03	0.03	0.02	0.02	0.04	0.02	0.02	0.01	0.02	0.02	0.01	0.01	0.02	—
		Max.	0.08	0.08	0.03	0.06	0.05	0.05	0.04	0.04	0.04	0.03	0.02	0.04	0.03	0.02	0.02	0.02	0.02	0.01	0.01	0.02	nd
		Min.	0.05	0.07	0.03	0.06	0.04	0.04	0.03	0.03	0.03	0.01	0.01	0.03	0.02	0.02	0.01	0.02	0.01	0.01	0.01	0.01	nd
Noto Peninsula, Ishikawa Pref.	Common mussel	Average				—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.				nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.				nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Ise Bay	Common mussel	Average												—	0.07	0.06	0.02	0.01	0.02	0.03	0.02	0.02	0.02
		Max.												0.11	0.07	0.06	0.02	0.02	0.02	0.03	0.03	0.02	0.02
		Min.												0.11	0.06	0.05	0.02	0.01	0.02	0.02	0.02	0.02	0.02
Shimane Peninsula	Common mussel	Average														0.04	—	—	0.01	0.10	0.03	0.02	0.08
		Max.														0.05	tr	0.02	0.02	0.11	0.04	0.03	0.09
		Min.														0.02	nd	tr	0.01	0.09	0.02	0.02	0.07
Naruto	Asiatic mussel	Average	0.08	0.07	0.04	0.03	0.03	0.09	0.08	0.06	0.05	0.03	0.04	0.05	0.04	0.05	0.03	0.02	—	—	—	—	—
		Max.	0.09	0.08	0.05	0.04	0.03	0.10	0.09	0.09	0.09	0.06	0.05	0.07	0.05	0.06	0.04	0.03	0.01	nd	nd	nd	nd
		Min.	0.07	0.06	0.04	0.02	0.03	0.07	0.07	0.03	0.02	0.02	0.02	0.02	0.03	0.03	0.02	0.02	nd	nd	nd	nd	nd

(Birds)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Suburbs of Morioka Iwate Pref.	Gray starling	Average	0.01	0.02	0.03	0.02	—	—	—	—	—	0.01	—	—	—	—	—	—	—	—	—	—	—
		Max.	0.02	0.03	0.05	0.03	0.01	tr	0.01	tr	0.01	0.02	0.01	0.01	tr	tr	tr	tr	tr	nd	0.01	tr	nd
		Min.	nd	0.02	0.02	0.02	nd	tr	tr	tr	tr	0.01	tr	tr	nd	tr	tr	tr	nd	nd	tr	nd	nd
Tokyo Bay	Black-tailed gull	Average					—	1.86	1.96	1.68	1.20	2.00	2.84	1.40	1.56	2.56	1.15	0.77					
		Max.					8.90	2.60	2.30	2.10	1.50	2.80	3.60	1.90	2.00	3.30	1.40	0.87					
		Min.					2.90	1.20	1.60	1.40	1.00	1.40	1.80	1.10	1.00	2.00	0.79	0.66					
Kabushima	Black-tailed gull	Average																		0.34	0.03	0.02	0.02
		Max.																		0.67	0.05	0.02	0.02
		Min.																		0.14	0.02	0.02	0.01

(Note)　nd : not detected, tr : trace

The sample picking area of Angry rockfish was changed from Offshore of Nemuro Hokkaido to Offshore of Kushiro Hokkaido from the fiscal year 1998.

Table E-2 p,p'-DDT (Fiscal Year 1978-1998)

(Fishes) (Unit: ppm)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Offshore of Kushiro, Hokkaido	Chum salmon	Average	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Max.	nd	0.002	nd	nd	nd	nd	nd	nd	nd	nd	0.001	nd	0.001	nd	nd	nd	nd	0.001	nd	nd	nd
		Min.	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Nemuro, Hokkaido	Angry rockfish	Average	0.034	0.017	0.036	0.041	0.069	0.052	0.058	0.023	0.039	0.035	0.039	0.029	0.030	0.046	0.034	0.078	0.036	0.022	0.018	0.026	0.003
		Max.	0.048	0.026	0.074	0.068	0.110	0.068	0.081	0.041	0.072	0.051	0.068	0.076	0.037	0.088	0.043	0.095	0.050	0.044	0.035	0.047	0.005
		Min.	0.025	0.009	0.010	0.020	0.027	0.021	0.031	0.011	0.014	0.024	0.025	0.008	0.021	0.014	0.025	0.050	0.026	0.012	0.013	0.005	0.002
Yamada Bay, Iwate Pref.	Greenling	Average			0.003	0.003	0.002	0.004	0.002	–	0.002	–	–	–	–	–	–	–	–	–	–	–	–
		Max.			0.005	0.004	0.003	0.006	0.003	0.002	0.003	0.001	tr	nd	nd	nd	tr	nd	0.002	nd	0.001	tr	0.002
		Min.			0.002	0.002	0.001	0.002	0.002	tr	0.001	tr	nd	nd	nd	nd	nd	nd	nd	nd	tr	nd	nd
Offshore of Joban	Pacific saury	Average	0.004	0.002	0.003	–	0.002	0.002	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Max.	0.004	0.002	0.003	0.001	0.002	0.002	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.	0.003	0.002	0.003	nd	0.001	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Tohoku, Sea of Japan	Cod	Average			0.008	0.003	0.004	–	0.002	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Max.			0.015	0.005	0.008	0.002	0.002	0.003	nd	0.004	nd	nd	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.002	0.001
		Min.			0.006	0.002	0.002	nd	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tokyo Bay	Sea bass	Average	0.012	0.002	0.007	–	0.002	0.001	0.002	0.002	0.001	0.001	0.001	0.007	–	0.002	0.001	0.002	–	0.002	0.003	–	0.003
		Max.	0.016	0.003	0.009	nd	0.003	0.002	0.002	0.003	0.002	0.002	0.002	0.012	nd	0.002	0.003	0.003	nd	0.002	0.004	0.001	0.005
		Min.	0.004	0.002	0.005	nd	0.002	0.001	0.001	0.001	0.001	0.001	0.001	0.004	nd	0.001	0.001	0.001	nd	0.001	0.003	tr	0.002
Osaka Bay	Sea bass	Average			0.010	0.013	0.006	0.007	0.005	0.003	0.002	0.002	0.001	0.002	0.003	–	0.002	0.002	0.002	0.017	0.008	0.002	0.002
		Max.			0.022	0.022	0.010	0.013	0.006	0.004	0.003	0.003	0.002	0.003	0.004	0.001	0.003	0.003	0.003	0.030	0.013	0.002	0.003
		Min.			0.004	0.009	0.003	0.002	0.002	0.002	0.002	0.001	0.001	0.002	0.002	tr	0.002	0.001	0.001	0.004	0.002	0.001	0.002
Seto Inland Sea	Sea bass	Average		0.028	0.007	–	0.093	–	0.002	0.008	0.003	0.002	0.019	0.003			–	–	–	–	–	–	0.002
		Max.		0.036	0.010	0.075	0.160	0.004	0.002	0.014	0.007	0.004	0.062	0.005			nd	nd	0.002	0.003	0.016	0.005	0.002
		Min.		0.020	0.004	nd	0.003	nd	0.001	0.004	0.001	0.001	0.002	0.002			nd	nd	nd	nd	nd	nd	0.001
Offshore of Sanin	Sea bass	Average					0.009	0.007	0.002	0.006	–	–	0.001	0.002	–	0.002	0.003	0.001	–	–	–	–	0.002
		Max.					0.011	0.009	0.003	0.022	0.001	0.002	0.002	0.002	0.001	0.002	0.004	0.002	tr	tr	0.002	nd	0.003
		Min.					0.007	0.005	0.001	0.001	tr	tr	0.001	0.001	tr	0.001	0.002	0.001	nd	nd	tr	nd	0.002
Mouth of the Riv. Shimanto	Sea bass	Average							0.012	0.007	0.007	0.005	–	–	0.005	–	–	–	–	–	–	–	–
		Max.							0.030	0.016	0.022	0.010	nd	0.002	0.007	0.002	nd	0.007	nd	nd	nd	tr	tr
		Min.							0.002	0.002	0.002	0.002	nd	tr	0.003	nd	nd	nd	nd	nd	nd	nd	nd
Surrouding of Shugen Island	Sea bass	Average													–	–	–	–	–	–	0.003	–	–
		Max.													0.001	tr	nd	nd	tr	0.004	0.004	0.002	0.003
		Min.													nd	nd	nd	nd	nd	tr	0.002	tr	nd
West Coast of Satsuma Peninsula	Sea bass	Average							0.003	0.005	0.002	0.002	–	–	–	–	–	–	–	–	–	–	–
		Max.							0.008	0.011	0.002	0.003	nd	0.003	nd	0.001	0.001	0.001	tr	0.001	0.001	nd	tr
		Min.							0.001	0.002	0.001	0.001	nd	nd	nd	tr	tr	tr	nd	tr	tr	nd	nd
Nakagusuku Bay Okinawa Pref.	Black porgy	Average										–	–	–	–	–	–	–	–	–	–	–	–
		Max.										0.001	0.001	0.001	nd	nd	nd	nd	tr	nd	tr	tr	0.004
		Min.										nd	tr	tr	nd	nd	nd	nd	nd	nd	tr	tr	tr
Lake Biwa, Shiga Pref.	Dace	Average		–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.004	0.004	0.002	–
		Max.		nd	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.005	0.004	0.003	nd
		Min.		nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.003	0.003	0.002	nd

(Shellfishes)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Yamada Bay, Iwate Pref.	Common mussel	Average	0.002	0.002	0.001	–	0.002	0.001	0.001	–	0.003	–	0.002	–	–	–	–	–	–	–	–	–	–
		Max.	0.003	0.002	0.002	0.001	0.002	0.002	0.001	nd	0.003	tr	0.002	tr	0.001	0.002	nd	nd	nd	nd	nd	nd	nd
		Min.	0.002	0.002	0.001	nd	0.001	0.001	0.001	nd	0.002	tr	0.002	tr	nd	nd	nd	nd	nd	nd	nd	nd	nd
Miura Peninsula, Kanagawa Pref.	Common mussel	Average	0.003	0.005	0.002	–	0.001	0.004	0.002	0.001	0.001	0.001	0.001	0.001	–	0.001	–	–	–	–	–	–	–
		Max.	0.003	0.006	0.003	nd	0.002	0.004	0.002	0.001	0.001	0.001	0.001	0.001	nd	0.001	nd	nd	nd	nd	nd	nd	nd
		Min.	0.003	0.004	0.001	nd	0.001	0.003	0.002	0.001	0.001	0.001	0.001	0.001	nd	0.001	nd	nd	nd	nd	nd	nd	nd
Noto Peninsula, Ishikawa Pref.	Common mussel	Average				0.004	0.002	0.005	–	–	–	–	0.001	0.001	–	–	–	–	–	–	–	–	–
		Max.				0.004	0.002	0.007	0.002	nd	nd	nd	0.001	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.				0.002	0.001	0.002	nd	nd	nd	nd	0.001	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd
Ise Bay	Common mussel	Average												–	–	–	–	–	–	–	–	–	–
		Max.												nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.												nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Shimane Peninsula	Common mussel	Average														0.001	–	–	–	0.021	–	–	–
		Max.														0.001	tr	nd	nd	0.024	nd	nd	nd
		Min.														0.001	tr	nd	nd	0.020	nd	nd	nd
Naruto	Asiatic mussel	Average	0.010	0.007	0.004	–	0.008	0.003	0.003	0.002	0.001	0.002	–	–	0.002	–	–	–	–	–	–	–	–
		Max.	0.013	0.008	0.005	nd	0.010	0.003	0.004	0.003	0.002	0.002	0.002	0.001	0.002	nd	nd	nd	nd	nd	nd	nd	nd
		Min.	0.008	0.005	0.002	nd	0.007	0.003	0.002	0.002	0.001	0.001	nd	nd	0.002	nd	nd	nd	nd	nd	nd	nd	nd

(Birds)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Suburbs of Morioka Iwate Pref.	Gray starling	Average	0.003	–	0.007	–	–	0.004	–	–	–	0.002	0.001	–	–	–	–	0.001	0.001	–	–	–	0.001
		Max.	0.007	nd	0.013	0.006	0.002	0.005	0.001	0.001	0.004	0.006	0.002	tr	0.001	0.001	0.001	0.001	0.001	0.001	nd	tr	0.002
		Min.	nd	nd	0.002	nd	nd	0.004	nd	tr	tr	0.001	0.001	nd	nd	tr	nd	0.001	0.001	tr	nd	nd	0.001
Tokyo Bay	Black-tailed gull	Average					–	–	–	0.011	–	–	–	–	–	0.003	–	–					
		Max.					nd	0.001	nd	0.043	0.001	nd	nd	nd	0.002	0.005	nd	nd					
		Min.					nd	nd	nd	0.001	nd	nd	nd	nd	nd	0.002	nd	nd					
Kabushima	Black-tailed gull	Average																		–	–	–	–
		Max.																		nd	nd	nd	0.001
		Min.																		nd	nd	nd	nd

(Note) nd : not detected, tr : trace

The sample picking area of Angry rockfish was changed from Offshore of Nemuro Hokkaido to Offshore of Kushiro Hokkaido from the fiscal year 1998.

Table E-3 p,p’-DDE (Fiscal Year 1978-1998)

(Fishes) (Unit: ppm)

Sampling spot	Species	Classi-fication	‘78	‘79	‘80	‘81	‘82	‘83	‘84	‘85	‘86	‘87	‘88	‘89	‘90	‘91	‘92	‘93	‘94	‘95	‘96	‘97	‘98
Offshore of Kushiro, Hokkaido	Chum salmon	Average	0.002	0.001	–	–	–	–	–	–	–	–	–	–	–	–	–	–	0.002	0.001	–	–	–
		Max.	0.002	0.002	0.001	nd	nd	nd	nd	0.001	0.002	0.001	0.002	0.001	0.001	nd	0.001	0.001	0.002	0.002	0.002	0.001	nd
		Min.	0.002	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.001	0.001	nd	nd	nd
Offshore of Nemuro, Hokkaido	Angry rockfish	Average	0.024	0.009	0.022	0.013	0.020	0.013	0.014	0.011	0.027	0.027	0.020	0.022	0.022	0.029	0.030	0.060	0.026	0.016	0.019	0.019	0.008
		Max.	0.039	0.013	0.039	0.015	0.031	0.017	0.016	0.016	0.040	0.046	0.024	0.044	0.027	0.043	0.039	0.077	0.030	0.020	0.025	0.028	0.010
		Min.	0.012	0.005	0.008	0.010	0.011	0.006	0.012	0.007	0.011	0.014	0.016	0.008	0.014	0.016	0.023	0.046	0.020	0.011	0.017	0.011	0.006
Yamada Bay, Iwate Pref.	Greenling	Average			0.003	0.003	0.004	0.006	0.002	–	0.005	0.004	–	–	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.004	0.002
		Max.			0.005	0.006	0.006	0.008	0.003	0.004	0.009	0.007	0.003	0.001	0.004	0.002	0.003	0.002	0.003	0.002	0.003	0.005	0.003
		Min.			0.003	0.002	0.002	0.003	0.001	tr	0.003	0.003	tr	tr	0.002	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.001
Offshore of Joban	Pacific saury	Average	0.003	0.003	0.002	0.001	0.001	0.002	–	–	0.001	–	–	–	0.001	–	–	–	–	–	–	–	0.002
		Max.	0.003	0.003	0.002	0.002	0.001	0.002	tr	nd	0.001	tr	nd	nd	0.001	0.001	nd	0.001	0.001	nd	nd	0.001	0.002
		Min.	0.003	0.002	0.002	0.001	0.001	0.001	tr	nd	0.001	tr	nd	nd	0.001	nd	nd	nd	nd	nd	nd	nd	0.001
Offshore of Tohoku, Sea of Japan	Cod	Average			0.005	0.003	0.003	0.001	0.003	0.002	–	–	–	–	–	–	–	–	–	0.002	–	–	–
		Max.			0.009	0.004	0.006	0.002	0.003	0.004	0.002	0.003	0.001	0.002	0.003	0.005	0.002	0.001	0.001	0.002	0.002	0.002	0.002
		Min.			0.004	0.002	0.002	0.001	0.002	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.001	nd	nd	nd
Tokyo Bay	Sea bass	Average	0.029	0.022	0.052	0.043	0.014	0.009	0.009	0.011	0.006	0.011	0.011	0.027	0.009	0.030	0.021	0.053	0.018	0.006	0.009	0.018	0.016
		Max.	0.042	0.033	0.069	0.086	0.022	0.015	0.011	0.014	0.009	0.013	0.016	0.042	0.011	0.041	0.049	0.070	0.026	0.008	0.012	0.033	0.021
		Min.	0.011	0.018	0.029	0.012	0.009	0.006	0.008	0.009	0.005	0.009	0.007	0.017	0.008	0.019	0.009	0.032	0.013	0.004	0.008	0.005	0.010
Osaka Bay	Sea bass	Average			0.059	0.129	0.037	0.028	0.026	0.011	0.012	0.012	0.010	0.023	0.019	0.010	0.010	0.014	0.011	0.009	0.015	0.007	0.015
		Max.			0.138	0.180	0.069	0.039	0.042	0.014	0.015	0.019	0.012	0.030	0.029	0.018	0.010	0.023	0.017	0.013	0.021	0.009	0.016
		Min.			0.022	0.075	0.014	0.014	0.010	0.009	0.009	0.009	0.007	0.020	0.015	0.005	0.009	0.008	0.008	0.007	0.007	0.005	0.012
Seto Inland Sea	Sea bass	Average		0.037	0.035	0.052	0.238	0.033	0.031	0.039	0.057	0.014	0.094	0.028			0.006	0.007	0.005	0.010	0.031	0.008	0.004
		Max.		0.048	0.043	0.130	0.360	0.054	0.038	0.048	0.013	0.028	0.230	0.035			0.007	0.010	0.006	0.018	0.094	0.017	0.005
		Min.		0.028	0.027	0.006	0.032	0.010	0.019	0.023	0.029	0.008	0.020	0.009			0.004	0.005	0.003	0.004	0.006	0.003	0.003
Offshore of Sanin	Sea bass	Average					0.028	0.024	0.017	0.009	0.009	0.009	0.011	0.004	0.005	0.005	0.008	0.007	0.003	0.004	0.005	0.006	0.003
		Max.					0.037	0.038	0.019	0.011	0.010	0.014	0.012	0.004	0.007	0.006	0.009	0.008	0.004	0.005	0.007	0.007	0.004
		Min.					0.022	0.016	0.012	0.007	0.006	0.006	0.009	0.003	0.004	0.004	0.007	0.006	0.002	0.003	0.003	0.005	0.003
Mouth of the Riv. Shimanto	Sea bass	Average							0.088	0.042	0.012	0.012	0.005	0.004	0.013	0.002	0.001	–	–	0.002	–	–	0.001
		Max.							0.200	0.154	0.021	0.019	0.008	0.007	0.018	0.004	0.001	0.005	0.006	0.002	0.001	0.001	0.002
		Min.							0.022	0.009	0.004	0.007	0.003	0.003	0.011	0.001	0.001	tr	nd	0.001	nd	tr	0.001
Surrouding of Shugen Island	Sea bass	Average													0.002	0.007	0.005	0.002	0.001	0.007	0.002	0.003	0.003
		Max.													0.005	0.014	0.008	0.003	0.002	0.018	0.004	0.005	0.005
		Min.													0.001	0.004	0.003	0.001	0.001	0.001	0.001	0.002	0.001
West Coast of Satsuma Peninsula	Sea bass	Average							0.014	0.023	0.011	0.009	0.005	0.015	0.002	0.007	0.004	0.004	0.003	0.004	0.003	–	0.002
		Max.							0.037	0.038	0.013	0.010	0.008	0.039	0.004	0.009	0.005	0.005	0.005	0.008	0.003	0.001	0.002
		Min.							0.007	0.011	0.009	0.008	0.003	0.006	0.001	0.005	0.003	0.003	0.002	0.001	0.002	nd	0.001
Nakagusuku Bay Okinawa Pref.	Black porgy	Average										0.007	0.006	0.008	–	0.002	0.003	0.003	0.002	–	–	–	–
		Max.										0.018	0.016	0.016	0.007	0.003	0.006	0.005	0.003	0.002	0.005	tr	0.002
		Min.										0.001	0.001	0.002	tr	0.002	0.001	0.002	0.001	nd	tr	nd	tr
Lake Biwa, Shiga Pref.	Dace	Average		0.030	0.041	0.028	0.037	0.091	0.034	0.036	0.030	0.025	0.016	0.034	0.040	0.022	0.022	0.045	0.016	0.015	0.015	0.010	0.010
		Max.		0.038	0.049	0.045	0.045	0.125	0.039	0.053	0.035	0.028	0.020	0.045	0.049	0.027	0.039	0.051	0.019	0.018	0.016	0.012	0.011
		Min.		0.022	0.034	0.021	0.026	0.041	0.029	0.027	0.026	0.018	0.010	0.028	0.029	0.015	0.016	0.042	0.014	0.011	0.011	0.008	0.009

(Shellfishes)

Sampling spot	Species	Classi-fication	‘78	‘79	‘80	‘81	‘82	‘83	‘84	‘85	‘86	‘87	‘88	‘89	‘90	‘91	‘92	‘93	‘94	‘95	‘96	‘97	‘98
Yamada Bay, Iwate Pref.	Common mussel	Average	0.002	0.001	0.001	0.001	0.001	–	0.001	–	0.002	0.002	0.002	–	–	–	0.001	–	–	–	–	–	–
		Max.	0.003	0.001	0.002	0.001	0.001	tr	0.001	tr	0.002	0.002	0.002	tr	tr	tr	0.002	0.001	tr	tr	tr	tr	nd
		Min.	0.002	0.001	0.001	0.001	0.001	tr	0.001	tr	0.002	0.001	0.001	nd	tr	tr	0.001	tr	tr	tr	tr	tr	nd
Miura Peninsula, Kanagawa Pref.	Common mussel	Average	0.005	0.004	0.002	0.005	0.003	0.002	0.002	0.001	0.002	0.002	0.002	0.002	0.001	–	0.003	0.002	0.003	0.003	0.002	0.003	0.003
		Max.	0.006	0.005	0.003	0.005	0.003	0.003	0.002	0.001	0.002	0.002	0.003	0.002	0.001	nd	0.004	0.003	0.003	0.003	0.003	0.003	0.003
		Min.	0.005	0.004	0.002	0.004	0.002	0.002	0.002	0.001	0.001	0.002	0.002	0.001	0.001	nd	0.003	0.002	0.003	0.003	0.001	0.003	0.003
Noto Peninsula, Ishikawa Pref.	Common mussel	Average				–	0.003	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–	–
		Max.				0.001	0.004	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.				nd	0.003	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Ise Bay	Common mussel	Average												–	0.002	–	0.002	–	0.001	0.001	0.001	0.001	0.001
		Max.												0.003	0.003	0.004	0.003	0.001	0.001	0.001	0.001	0.001	0.001
		Min.												0.003	0.002	nd	0.002	nd	0.001	0.001	0.001	0.001	0.001
Shimane Peninsula	Common mussel	Average														0.002	–	0.001	–	0.008	–	0.004	0.003
		Max.														0.002	tr	0.001	tr	0.008	nd	0.004	0.003
		Min.														0.002	tr	0.001	tr	0.008	nd	0.003	0.003
Naruto	Asiatic mussel	Average	0.010	0.006	0.006	0.003	0.002	0.006	0.005	0.004	0.004	0.002	0.001	0.003	0.002	0.002	–	–	–	–	–	–	0.001
		Max.	0.012	0.007	0.007	0.004	0.003	0.006	0.006	0.005	0.006	0.002	0.002	0.004	0.003	0.002	0.002	0.001	0.001	nd	nd	nd	0.001
		Min.	0.008	0.005	0.005	0.002	0.002	0.005	0.004	0.002	0.002	0.001	0.001	0.002	0.002	0.002	nd	nd	nd	nd	nd	nd	0.001

(Birds)

Sampling spot	Species	Classi-fication	‘78	‘79	‘80	‘81	‘82	‘83	‘84	‘85	‘86	‘87	‘88	‘89	‘90	‘91	‘92	‘93	‘94	‘95	‘96	‘97	‘98
Suburbs of Morioka Iwate Pref.	Gray starling	Average	0.040	0.235	0.214	0.166	0.116	0.095	0.099	0.097	0.158	0.114	0.132	0.186	0.111	0.081	0.095	0.115	0.113	0.064	0.077	0.118	0.107
		Max.	0.095	0.430	0.406	0.323	0.186	0.130	0.120	0.120	0.300	0.160	0.150	0.220	0.160	0.120	0.120	0.150	0.150	0.084	0.108	0.149	0.14
		Min.	0.021	0.164	0.124	0.112	0.047	0.058	0.088	0.078	0.100	0.078	0.120	0.150	0.072	0.045	0.067	0.090	0.076	0.051	0.068	0.083	0.089
Tokyo Bay	Black-tailed gull	Average					–	0.414	0.480	0.370	0.258	0.288	0.264	0.234	0.254	0.328	0.332	0.336					
		Max.					1.100	0.510	0.580	0.610	0.380	0.320	0.400	0.310	0.310	0.460	0.460	0.520					
		Min.					0.460	0.350	0.430	0.220	0.180	0.230	0.150	0.190	0.210	0.240	0.250	0.220					
Kabushima	Black-tailed gull	Average																		0.247	0.018	0.012	0.013
		Max.																		0.700	0.024	0.020	0.016
		Min.																		0.063	0.013	0.009	0.010

(Note) nd : not detected, tr : trace

The sample picking area of Angry rockfish was changed from Offshore of Nemuro Hokkaido to Offshore of Kushiro Hokkaido from the fiscal year 1998.

Table E-4 p, p'-DDD (Fiscal Year 1978-98)

(Fishes) (Unit: ppm)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Offshore of Kushiro, Hokkaido	Chum salmon	Average	0.002	0.001	—	—	—	—	—	—	—	—	—	—	—	—	—	—	0.002	0.001	—	—	—
		Max.	0.002	0.002	0.001	nd	nd	nd	nd	0.001	0.002	0.001	0.002	0.001	0.001	nd	0.001	0.001	0.002	0.002	0.002	0.001	nd
		Min.	0.002	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.001	0.001	nd	nd	nd
Offshore of Nemuro, Hokkaido	Angry rockfish	Average	0.024	0.009	0.022	0.013	0.020	0.013	0.014	0.011	0.027	0.027	0.020	0.022	0.022	0.029	0.030	0.060	0.026	0.016	0.019	0.019	0.008
		Max.	0.039	0.013	0.039	0.015	0.031	0.017	0.016	0.016	0.040	0.046	0.024	0.044	0.027	0.043	0.039	0.077	0.030	0.020	0.025	0.028	0.010
		Min.	0.012	0.005	0.008	0.010	0.011	0.006	0.012	0.007	0.011	0.014	0.016	0.008	0.014	0.016	0.023	0.046	0.020	0.011	0.017	0.011	0.006
Yamada Bay, Iwate Pref.	Greenling	Average			0.003	0.003	0.004	0.006	0.002	—	0.005	0.004	—	—	0.003	0.002	0.002	0.002	0.002	0.002	0.002	0.004	0.002
		Max.			0.005	0.006	0.006	0.008	0.003	0.004	0.009	0.007	0.003	0.001	0.004	0.002	0.003	0.002	0.003	0.002	0.003	0.005	0.003
		Min.			0.003	0.002	0.002	0.003	0.001	tr	0.003	0.003	tr	tr	0.002	0.001	0.001	0.001	0.001	0.002	0.002	0.002	0.001
Offshore of Joban	Pacific saury	Average	0.003	0.003	0.002	0.001	0.001	0.002	—	—	0.001	—	—	—	0.001	—	—	—	—	—	—	—	0.002
		Max.	0.003	0.003	0.002	0.002	0.001	0.002	tr	nd	0.001	tr	nd	nd	0.001	0.001	nd	0.001	0.001	nd	nd	0.001	0.002
		Min.	0.003	0.002	0.002	0.001	0.001	0.001	tr	nd	0.001	tr	nd	nd	0.001	nd	nd	nd	nd	nd	nd	nd	0.001
Offshore of Tohoku, Sea of Japan	Cod	Average			0.005	0.003	0.003	0.001	0.003	0.002	—	—	—	—	—	—	—	—	—	0.002	—	—	—
		Max.			0.009	0.004	0.006	0.002	0.003	0.004	0.002	0.003	0.001	0.002	0.003	0.005	0.002	0.001	0.001	0.002	0.002	0.002	0.002
		Min.			0.004	0.002	0.002	0.001	0.002	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.001	nd	nd	nd
Tokyo Bay	Sea bass	Average	0.029	0.022	0.052	0.043	0.014	0.009	0.009	0.011	0.006	0.011	0.011	0.027	0.009	0.030	0.021	0.053	0.018	0.006	0.009	0.018	0.016
		Max.	0.042	0.033	0.069	0.086	0.022	0.015	0.011	0.014	0.009	0.013	0.016	0.042	0.011	0.041	0.049	0.070	0.026	0.008	0.012	0.033	0.021
		Min.	0.011	0.018	0.029	0.012	0.009	0.006	0.008	0.009	0.005	0.009	0.007	0.017	0.008	0.019	0.009	0.032	0.013	0.004	0.008	0.005	0.010
Osaka Bay	Sea bass	Average			0.059	0.129	0.037	0.028	0.026	0.011	0.012	0.012	0.010	0.023	0.019	0.010	0.010	0.014	0.011	0.009	0.015	0.007	0.015
		Max.			0.138	0.180	0.069	0.039	0.042	0.014	0.015	0.019	0.012	0.030	0.029	0.018	0.010	0.023	0.017	0.013	0.021	0.009	0.016
		Min.			0.022	0.075	0.014	0.014	0.010	0.009	0.009	0.009	0.007	0.020	0.015	0.005	0.009	0.008	0.008	0.007	0.007	0.005	0.012
Seto Inland Sea	Sea bass	Average		0.037	0.035	0.052	0.238	0.033	0.031	0.039	0.057	0.014	0.094	0.028			0.006	0.007	0.005	0.010	0.031	0.008	0.004
		Max.		0.048	0.043	0.130	0.360	0.054	0.038	0.048	0.013	0.028	0.230	0.035			0.007	0.010	0.006	0.018	0.094	0.017	0.005
		Min.		0.028	0.027	0.006	0.032	0.010	0.019	0.023	0.029	0.008	0.020	0.009			0.004	0.005	0.003	0.004	0.006	0.003	0.003
Offshore of Sanin	Sea bass	Average					0.028	0.024	0.017	0.009	0.009	0.009	0.011	0.004	0.005	0.005	0.008	0.007	0.003	0.004	0.005	0.006	0.003
		Max.					0.037	0.038	0.019	0.011	0.010	0.014	0.012	0.004	0.007	0.006	0.009	0.008	0.004	0.005	0.007	0.007	0.004
		Min.					0.022	0.016	0.012	0.007	0.006	0.006	0.009	0.003	0.004	0.004	0.007	0.006	0.002	0.003	0.003	0.005	0.003
Mouth of the Riv. Shimanto	Sea bass	Average							0.088	0.042	0.012	0.012	0.005	0.004	0.013	0.002	0.001	—	—	0.002	—	—	0.001
		Max.							0.200	0.154	0.021	0.019	0.008	0.007	0.018	0.004	0.001	0.005	0.006	0.002	0.001	0.001	0.002
		Min.							0.022	0.009	0.004	0.007	0.003	0.003	0.011	0.001	0.001	tr	nd	0.001	nd	tr	0.001
Surrouding of Shugen Island	Sea bass	Average													0.002	0.007	0.005	0.002	0.001	0.007	0.002	0.003	0.003
		Max.													0.005	0.014	0.008	0.003	0.002	0.018	0.004	0.005	0.005
		Min.													0.001	0.004	0.003	0.001	0.001	0.001	0.001	0.002	0.001
West Coast of Satsuma Peninsula	Sea bass	Average							0.014	0.023	0.011	0.009	0.005	0.015	0.002	0.007	0.004	0.004	0.003	0.004	0.003	—	0.002
		Max.							0.037	0.038	0.013	0.010	0.008	0.039	0.004	0.009	0.005	0.005	0.005	0.008	0.003	0.001	0.002
		Min.							0.007	0.011	0.009	0.008	0.003	0.006	0.001	0.005	0.003	0.003	0.002	0.001	0.002	nd	0.001
Nakagusuku Bay Okinawa Pref.	Black porgy	Average										0.007	0.006	0.008	—	0.002	0.003	0.003	0.002	—	—	—	—
		Max.										0.018	0.016	0.016	0.007	0.003	0.006	0.005	0.003	0.002	0.005	tr	0.002
		Min.										0.001	0.001	0.002	tr	0.002	0.001	0.002	0.001	nd	tr	nd	tr
Lake Biwa, Shiga Pref.	Dace	Average		0.030	0.041	0.028	0.037	0.091	0.034	0.036	0.030	0.025	0.016	0.034	0.040	0.022	0.022	0.045	0.016	0.015	0.015	0.010	0.010
		Max.		0.038	0.049	0.045	0.045	0.125	0.039	0.053	0.035	0.028	0.020	0.045	0.049	0.027	0.039	0.051	0.019	0.018	0.016	0.012	0.011
		Min.		0.022	0.034	0.021	0.026	0.041	0.029	0.027	0.026	0.018	0.010	0.028	0.029	0.015	0.016	0.042	0.014	0.011	0.011	0.008	0.009

(Shellfishes)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Yamada Bay, Iwate Pref.	Common mussel	Average	0.002	0.001	0.001	0.001	0.001	—	0.001	—	0.002	0.002	0.002	—	—	—	0.001	—	—	—	—	—	—
		Max.	0.003	0.001	0.002	0.001	0.001	tr	0.001	tr	0.002	0.002	0.002	tr	tr	tr	0.002	0.001	tr	tr	tr	tr	nd
		Min.	0.002	0.001	0.001	0.001	0.001	tr	0.001	tr	0.002	0.001	0.001	nd	tr	tr	0.001	tr	tr	tr	tr	tr	nd
Miura Peninsula, Kanagawa Pref.	Common mussel	Average	0.005	0.004	0.002	0.005	0.003	0.002	0.002	0.001	0.002	0.002	0.002	0.002	0.001	—	0.003	0.002	0.003	0.003	0.002	0.003	0.003
		Max.	0.006	0.005	0.003	0.005	0.003	0.003	0.002	0.001	0.002	0.002	0.003	0.002	0.001	nd	0.004	0.003	0.003	0.003	0.003	0.003	0.003
		Min.	0.005	0.004	0.002	0.004	0.002	0.002	0.002	0.001	0.001	0.002	0.002	0.001	0.001	nd	0.003	0.002	0.003	0.003	0.001	0.003	0.003
Noto Peninsula, Ishikawa Pref.	Common mussel	Average				—	0.003	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.				0.001	0.004	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.				nd	0.003	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Ise Bay	Common mussel	Average												—	0.002	—	0.002	—	0.001	0.001	0.001	0.001	0.001
		Max.												0.003	0.003	0.004	0.003	0.001	0.001	0.001	0.001	0.001	0.001
		Min.												0.003	0.002	nd	0.002	nd	0.001	0.001	0.001	0.001	0.001
Shimane Peninsula	Common mussel	Average														0.002	—	0.001	—	0.008	—	0.004	0.003
		Max.														0.002	tr	0.001	tr	0.008	nd	0.004	0.003
		Min.														0.002	tr	0.001	tr	0.008	nd	0.003	0.003
Naruto	Asiatic mussel	Average	0.010	0.006	0.006	0.003	0.002	0.006	0.005	0.004	0.004	0.002	0.001	0.003	0.002	0.002	—	—	—	—	—	—	0.001
		Max.	0.012	0.007	0.007	0.004	0.003	0.006	0.006	0.005	0.006	0.002	0.002	0.004	0.003	0.002	0.002	0.001	0.001	nd	nd	nd	0.001
		Min.	0.008	0.005	0.005	0.002	0.002	0.005	0.004	0.002	0.002	0.001	0.001	0.002	0.002	0.002	nd	nd	nd	nd	nd	nd	0.001

(Birds)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Suburbs of Morioka Iwate Pref.	Gray starling	Average	0.040	0.235	0.214	0.166	0.116	0.095	0.099	0.097	0.158	0.114	0.132	0.186	0.111	0.081	0.095	0.115	0.113	0.064	0.077	0.118	0.107
		Max.	0.095	0.430	0.406	0.323	0.186	0.130	0.120	0.120	0.300	0.160	0.150	0.220	0.160	0.120	0.120	0.150	0.150	0.084	0.108	0.149	0.14
		Min.	0.021	0.164	0.124	0.112	0.047	0.058	0.088	0.078	0.100	0.078	0.120	0.150	0.072	0.045	0.067	0.090	0.076	0.051	0.068	0.083	0.089
Tokyo Bay	Black-tailed gull	Average					—	0.414	0.480	0.370	0.258	0.288	0.264	0.234	0.254	0.328	0.332	0.336					
		Max.					1.100	0.510	0.580	0.610	0.380	0.320	0.400	0.310	0.310	0.460	0.460	0.520					
		Min.					0.460	0.350	0.430	0.220	0.180	0.230	0.150	0.190	0.210	0.240	0.250	0.220					
Kabushima	Black-tailed gull	Average																		0.247	0.018	0.012	0.013
		Max.																		0.700	0.024	0.020	0.016
		Min.																		0.063	0.013	0.009	0.010

(Note) nd : not detected, tr : trace

The sample picking area of Angry rockfish was changed from Offshore of Nemuro Hokkaido to Offshore of Kushiro Hokkaido from the fiscal year 1998.

Table E-5 trans-Chlordane (Fiscal Year 1978-98)

(Fishes) (Unit: ppm)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Offshore of Kushiro, Hokkaido	Chum salmon	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Nemuro, Hokkaido	Angry rockfish	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						0.001	nd	nd	nd	0.001	nd	nd	0.001	0.001	nd	0.001	0.001	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Yamada Bay, Iwate Pref.	Greenling	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Joban	Pacific saury	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	tr	tr	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	tr	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Tohoku, Sea of Japan	Cod	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tokyo Bay	Sea bass	Average						0.003	0.003	0.005	0.002	0.004	0.003	0.007	0.001	0.003	—	0.003	0.001	—	0.002	—	0.003
		Max.						0.004	0.004	0.006	0.003	0.006	0.004	0.009	0.002	0.003	0.003	0.004	0.001	0.001	0.002	tr	0.004
		Min.						0.002	0.002	0.004	0.001	0.003	0.001	0.005	0.001	0.002	nd	0.002	0.001	nd	0.002	tr	0.002
Osaka Bay	Sea bass	Average						0.008	0.009	0.007	0.010	0.007	0.007	0.011	0.008	0.007	0.004	0.005	0.002	0.002	0.007	0.001	0.004
		Max.						0.011	0.014	0.008	0.012	0.010	0.009	0.014	0.011	0.013	0.004	0.006	0.004	0.003	0.011	0.001	0.004
		Min.						0.005	0.002	0.006	0.008	0.006	0.005	0.009	0.006	0.005	0.004	0.004	0.003	0.002	0.003	0.001	0.003
Seto Inland Sea	Sea bass	Average						0.002	—	0.002	—	—	0.003	0.003			—	—	—	—	0.002	—	—
		Max.						0.002	0.001	0.004	0.004	0.002	0.008	0.004			0.003	nd	nd	nd	0.003	0.002	nd
		Min.						0.001	nd	0.001	nd	tr	0.001	0.001			nd	nd	nd	nd	0.001	nd	nd
Offshore of Sanin	Sea bass	Average						—	0.006	0.003	0.002	0.001	0.002	—	—	—	0.002	—	—	—	—	—	—
		Max.						0.004	0.007	0.004	0.003	0.002	0.004	0.002	0.001	nd	0.002	0.001	nd	tr	tr	tr	nd
		Min.						nd	0.005	0.002	0.002	0.001	0.001	nd	nd	nd	0.001	tr	nd	nd	tr	tr	nd
Mouth of the Riv. Shimanto	Sea bass	Average							—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.							0.003	0.002	tr	0.001	tr	0.002	tr	nd	nd	tr	tr	tr	nd	nd	nd
		Min.							nd	nd	tr	nd	nd	tr	tr	nd	nd	nd	tr	tr	nd	nd	nd
Surrouding of Shugen Island	Sea bass	Average													—	—	—	—	—	—	—	—	—
		Max.													nd	nd	nd	nd	nd	0.002	nd	nd	tr
		Min.													nd	nd	nd	nd	nd	nd	nd	nd	nd
West Coast of Satsuma Peninsula	Sea bass	Average							—	0.005	0.003	0.003	—	—	—	—	—	—	—	—	—	—	—
		Max.							0.001	0.009	0.004	0.006	nd	0.003	0.001	tr	nd	nd	nd	nd	nd	nd	nd
		Min.							nd	0.002	0.002	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nakagusuku Bay Okinawa Pref.	Black porgy	Average										—	—	—	—	—	—	—	—	—	—	—	—
		Max.										0.001	tr	tr	tr	nd	nd	tr	0.008	0.005	tr	nd	tr
		Min.										nd	tr	tr	tr	nd	nd	nd	nd	nd	nd	nd	nd
Lake Biwa, Shiga Pref.	Dace	Average						0.050	0.007	0.008	0.008	0.004	0.018	0.010	0.013	0.009	0.009	0.014	0.003	0.002	0.002	—	0.003
		Max.						0.070	0.007	0.010	0.009	0.006	0.024	0.011	0.016	0.010	0.011	0.016	0.006	0.004	0.003	0.001	0.003
		Min.						0.004	0.006	0.006	0.007	0.002	0.011	0.009	0.009	0.008	0.007	0.012	0.001	0.001	0.002	nd	0.002

(Shellfishes)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Yamada Bay, Iwate Pref.	Common mussel	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	nd	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Miura Peninsula, Kanagawa Pref.	Common mussel	Average						0.017	0.016	0.019	0.009	0.005	0.006	0.005	0.002	0.002	0.002	0.002	0.003	0.002	0.002	0.002	0.002
		Max.						0.018	0.018	0.020	0.010	0.006	0.007	0.005	0.002	0.003	0.002	0.002	0.003	0.002	0.003	0.002	0.002
		Min.						0.016	0.015	0.018	0.008	0.005	0.005	0.004	0.002	0.002	0.001	0.002	0.002	0.002	0.002	0.002	0.002
Noto Peninsula, Ishikawa Pref.	Common mussel	Average						—	—	—	0.001	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	0.001	0.001	0.002	0.001	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	nd	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Ise Bay	Common mussel	Average												—	0.003	0.005	0.002	0.001	0.001	0.002	0.001	0.001	0.001
		Max.												0.007	0.004	0.006	0.002	0.001	0.001	0.002	0.001	0.002	0.001
		Min.												0.007	0.003	0.004	0.002	0.001	0.001	0.002	0.001	0.001	0.001
Shimane Peninsula	Common mussel	Average														0.001	—	0.001	0.001	0.002	0.001	0.001	0.001
		Max.														0.001	tr	0.001	0.001	0.003	0.001	0.001	0.001
		Min.														0.001	tr	0.001	0.001	0.002	0.001	0.001	0.001
Naruto	Asiatic mussel	Average						0.010	0.013	0.018	0.015	0.016	—	0.012	0.016	0.009	0.014	0.008	0.008	0.007	0.004	0.004	0.003
		Max.						0.011	0.013	0.022	0.024	0.021	0.008	0.022	0.023	0.011	0.017	0.010	0.010	0.008	0.005	0.004	0.004
		Min.						0.010	0.012	0.015	0.003	0.008	nd	0.002	0.010	0.007	0.012	0.007	0.007	0.006	0.004	0.003	0.002

(Birds)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Suburbs of Morioka Iwate Pref.	Gray starling	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tokyo Bay	Black-tailed gull	Average						0.001	0.001	0.001	0.001	—	—	—	—	—	—	—					
		Max.						0.002	0.001	0.001	0.001	nd	nd	nd	nd	nd	nd	nd					
		Min.						0.001	0.001	0.001	0.001	nd	nd	nd	nd	nd	nd	nd					
Kabushima	Black-tailed gull	Average																		—	—	—	—
		Max.																		nd	nd	nd	nd
		Min.																		nd	nd	nd	nd

(Note) nd : not detected, tr : trace

The sample picking area of Angry rockfish was changed from Offshore of Nemuro Hokkaido to Offshore of Kushiro Hokkaido from the fiscal year 1998.

Table E-6 cis-Chlordane (Fiscal Year 1978-98)

(Fishes) (Unit: ppm)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Offshore of Kushiro, Hokkaido	Chum salmon	Average Max. Min.						— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd
Offshore of Nemuro, Hokkaido	Angry rockfish	Average Max. Min.						— 0.001 nd	— 0.002 nd	— nd nd	— 0.002 nd	0.003 0.004 0.002	— 0.002 nd	— 0.002 nd	0.002 0.003 0.001	0.002 0.004 0.002	0.002 0.002 0.001	0.008 0.010 0.005	0.003 0.005 0.001	— nd nd	— 0.002 nd	— 0.003 nd	— 0.002 nd
Yamada Bay, Iwate Pref.	Greenling	Average Max. Min.						— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— 0.001 nd	— nd nd	— nd nd	— nd nd	— nd nd
Offshore of Joban	Pacific saury	Average Max. Min.						0.002 0.002 0.002	0.002 0.002 0.001	— tr tr	— tr tr	— nd nd	— nd nd	— 0.002 nd	— 0.001 nd	— 0.001 nd	0.001 0.001 0.001	— 0.001 nd	— 0.001 nd	— 0.001 nd	— nd nd	0.001 0.001 0.001	— nd nd
Offshore of Tohoku, Sea of Japan	Cod	Average Max. Min.						— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd
Tokyo Bay	Sea bass	Average Max. Min.						0.007 0.010 0.005	0.007 0.008 0.005	0.015 0.018 0.013	0.007 0.009 0.004	0.016 0.022 0.011	0.009 0.012 0.004	0.025 0.035 0.017	0.004 0.006 0.003	0.008 0.010 0.005	0.005 0.009 0.003	0.009 0.011 0.007	0.003 0.004 0.002	0.002 0.003 0.002	0.003 0.003 0.002	— 0.002 tr	0.004 0.005 0.004
Osaka Bay	Sea bass	Average Max. Min.						0.019 0.024 0.015	0.027 0.042 0.008	0.016 0.020 0.014	0.017 0.021 0.013	0.015 0.020 0.012	0.013 0.016 0.009	0.015 0.020 0.012	0.012 0.016 0.010	0.008 0.019 0.005	0.006 0.008 0.005	0.013 0.015 0.009	0.007 0.011 0.006	0.006 0.006 0.005	0.016 0.027 0.008	0.003 0.004 0.002	0.009 0.010 0.007
Seto Inland Sea	Sea bass	Average Max. Min.						0.004 0.006 0.003	— 0.005 nd	0.004 0.007 0.001	0.004 0.010 0.002	0.003 0.005 0.001	0.010 0.022 0.004	0.007 0.010 0.003			0.005 0.007 0.003	0.002 0.003 0.001	0.002 0.002 0.002	0.003 0.004 0.001	0.006 0.010 0.002	— 0.006 nd	0.002 0.002 0.001
Offshore of Sanin	Sea bass	Average Max. Min.						0.006 0.012 0.002	0.015 0.019 0.012	0.007 0.009 0.005	0.005 0.006 0.004	0.002 0.004 0.002	0.004 0.006 0.003	0.004 0.005 0.003	0.003 0.003 0.002	— 0.002 nd	0.003 0.003 0.002	0.002 0.002 0.002	— tr tr	— 0.001 tr	— tr tr	— nd nd	— nd nd
Mouth of the Riv. Shimanto	Sea bass	Average Max. Min.							— 0.013 nd	0.004 0.008 0.001	0.002 0.003 0.001	0.002 0.003 0.001	— 0.001 tr	— 0.002 tr	0.001 0.001 0.001	— 0.001 nd	— tr tr	— 0.002 nd	— 0.001 tr	— tr nd	— nd nd	— tr nd	— nd nd
Surrouding of Shugen Island	Sea bass	Average Max. Min.													— nd nd	— 0.007 nd	— nd nd	— nd nd	— 0.002 nd	— 0.003 nd	— 0.001 nd	— tr nd	— 0.002 nd
West Coast of Satsuma Peninsula	Sea bass	Average Max. Min.							— 0.003 tr	0.009 0.019 0.005	0.007 0.009 0.005	0.004 0.006 0.001	0.001 0.002 0.001	0.003 0.006 0.001	— 0.002 nd	— 0.003 tr	— tr nd	— tr nd	— 0.001 nd	— 0.001 nd	— tr nd	— nd nd	— nd nd
Nakagusuku Bay Okinawa Pref.	Black porgy	Average Max. Min.										— 0.005 nd	— 0.002 tr	— 0.003 tr	— 0.005 tr	0.001 0.001 0.001	— 0.001 nd	— 0.001 tr	— 0.003 tr	— tr nd	— tr nd	— tr nd	— tr nd
Lake Biwa, Shiga Pref.	Dace	Average Max. Min.						0.012 0.015 0.011	0.015 0.016 0.013	0.019 0.023 0.015	0.013 0.015 0.011	0.018 0.026 0.014	0.015 0.021 0.010	0.009 0.010 0.008	0.019 0.022 0.014	0.012 0.013 0.010	0.013 0.015 0.011	0.011 0.012 0.009	0.009 0.017 0.004	0.007 0.008 0.005	0.006 0.008 0.006	0.006 0.009 0.004	0.007 0.009 0.005

(Shellfishes)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Yamada Bay, Iwate Pref.	Common mussel	Average Max. Min.						— 0.001 nd	— nd nd	— nd nd	— 0.001 nd	— nd nd	— nd nd	— nd nd	— 0.002 nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd
Miura Peninsula, Kanagawa Pref.	Common mussel	Average Max. Min.						0.017 0.018 0.016	0.010 0.011 0.010	0.012 0.013 0.011	0.008 0.009 0.007	0.006 0.006 0.005	0.004 0.004 0.004	0.003 0.004 0.003	0.003 0.003 0.002	0.003 0.003 0.002	0.002 0.002 0.001	0.003 0.003 0.002	0.003 0.003 0.002	0.002 0.002 0.002	0.003 0.003 0.003	0.003 0.004 0.003	0.002 0.003 0.002
Noto Peninsula, Ishikawa Pref.	Common mussel	Average Max. Min.						— nd nd	0.001 0.001 0.001	0.002 0.003 0.001	0.002 0.002 0.002	0.002 0.004 0.001	0.001 0.001 0.001	0.001 0.001 0.001	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd
Ise Bay	Common mussel	Average Max. Min.												— 0.009 0.009	0.005 0.006 0.005	0.007 0.008 0.005	0.003 0.003 0.003	0.002 0.002 0.002	0.002 0.002 0.002	0.003 0.004 0.002	0.002 0.002 0.002	0.002 0.002 0.002	0.001 0.001 0.001
Shimane Peninsula	Common mussel	Average Max. Min.														0.001 0.001 0.001	— tr tr	— 0.001 tr	0.001 0.001 0.001	0.002 0.002 0.002	— nd nd	0.001 0.001 0.001	0.001 0.001 0.001
Naruto	Asiatic mussel	Average Max. Min.						0.019 0.021 0.017	0.026 0.028 0.025	0.028 0.035 0.021	0.021 0.034 0.003	0.028 0.034 0.014	— 0.018 nd	0.024 0.044 0.002	0.039 0.053 0.026	0.023 0.032 0.017	0.032 0.040 0.024	0.029 0.034 0.026	0.031 0.036 0.028	0.037 0.041 0.033	0.023 0.025 0.020	0.018 0.023 0.016	0.013 0.016 0.010

(Birds)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Suburbs of Morioka Iwate Pref.	Gray starling	Average Max. Min.						— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd
Tokyo Bay	Black-tailed gull	Average Max. Min.						0.013 0.017 0.009	0.008 0.010 0.007	0.016 0.017 0.013	0.013 0.021 0.008	0.014 0.018 0.008	0.006 0.008 0.005	0.003 0.004 0.002	0.005 0.008 0.003	0.002 0.004 0.003	0.006 0.009 0.004	0.005 0.007 0.004					
Kabushima	Black-tailed gull	Average Max. Min.																		— nd nd	— 0.001 nd	— nd nd	— nd nd

(Note) nd : not detected, tr : trace

The sample picking area of Angry rockfish was changed from Offshore of Nemuro Hokkaido to Offshore of Kushiro Hokkaido from the fiscal year 1998.

Table E-7　trans-Nonachlor (Fiscal Year 1978-98)

(Fishes) (Unit: ppm)

Sampling spot	Species	Classi-fication	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Offshore of Kushiro, Hokkaido	Chum salmon	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.001	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Nemuro, Hokkaido	Angry rockfish	Average						—	—	—	0.003	0.003	—	—	0.003	0.006	0.006	0.015	0.004	0.003	0.003	0.004	0.002
		Max.						0.003	0.002	nd	0.005	0.005	0.007	0.003	0.005	0.010	0.009	0.018	0.007	0.004	0.004	0.006	0.003
		Min.						nd	nd	nd	0.002	0.002	nd	nd	0.001	0.004	0.004	0.012	0.002	0.002	0.002	0.002	0.001
Yamada Bay, Iwate Pref.	Greenling	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						0.001	0.001	0.002	0.002	nd	nd	nd	nd	nd	nd	nd	0.001	nd	0.001	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Joban	Pacific saury	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	tr	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Tohoku, Sea of Japan	Cod	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tokyo Bay	Sea bass	Average						0.012	0.010	0.020	0.010	0.039	0.010	0.042	0.006	0.011	0.008	0.012	0.004	0.003	0.003	—	0.006
		Max.						0.014	0.011	0.023	0.012	0.050	0.013	0.060	0.009	0.013	0.014	0.014	0.005	0.004	0.004	0.004	0.008
		Min.						0.009	0.008	0.016	0.007	0.031	0.008	0.024	0.005	0.006	0.004	0.008	0.004	0.002	0.003	tr	0.005
Osaka Bay	Sea bass	Average						0.031	0.064	0.033	0.033	0.026	0.019	0.030	0.029	0.016	0.011	0.009	0.011	0.007	0.019	0.005	0.005
		Max.						0.040	0.102	0.042	0.041	0.042	0.023	0.038	0.034	0.034	0.012	0.011	0.017	0.007	0.030	0.007	0.005
		Min.						0.024	0.018	0.029	0.026	0.019	0.015	0.023	0.025	0.010	0.009	0.006	0.008	0.006	0.009	0.003	0.004
Seto Inland Sea	Sea bass	Average						0.005	0.005	0.010	0.007	0.005	0.015	0.013			0.007	0.003	0.003	0.008	0.019	0.004	0.003
		Max.						0.006	0.006	0.016	0.015	0.009	0.033	0.018			0.009	0.004	0.003	0.015	0.033	0.011	0.004
		Min.						0.003	0.003	0.006	0.005	0.002	0.005	0.004			0.003	0.002	0.002	0.003	0.003	0.001	0.002
Offshore of Sanin	Sea bass	Average						0.010	0.020	0.010	0.007	0.003	0.005	0.005	0.004	0.002	0.005	0.003	0.002	0.002	—	0.003	0.002
		Max.						0.021	0.025	0.015	0.010	0.005	0.007	0.007	0.005	0.002	0.006	0.004	0.002	0.002	0.002	0.004	0.002
		Min.						0.003	0.017	0.007	0.006	0.002	0.004	0.003	0.003	0.001	0.005	0.002	0.001	0.001	nd	0.002	0.001
Mouth of the Riv. Shimanto	Sea bass	Average							0.016	0.011	0.007	0.007	0.004	0.003	0.004	—	—	—	—	0.002	—	—	0.001
		Max.							0.032	0.021	0.011	0.008	0.006	0.007	0.006	0.002	0.001	0.007	0.004	0.003	0.001	0.001	0.002
		Min.							0.006	0.006	0.006	0.006	0.002	0.002	0.003	tr	tr	tr	tr	0.002	nd	tr	0.001
Surrouding of Shugen Island	Sea bass	Average													—	0.009	0.002	0.002	—	—	—	—	—
		Max.													0.001	0.025	0.002	0.003	0.002	0.010	0.002	0.002	0.005
		Min.													nd	0.002	0.002	0.001	tr	nd	tr	tr	nd
West Coast of Satsuma Peninsula	Sea bass	Average							0.006	0.019	0.015	0.015	0.007	0.010	—	0.003	0.001	0.002	—	0.001	—	—	—
		Max.							0.009	0.038	0.019	0.029	0.012	0.016	0.004	0.004	0.002	0.004	0.003	0.002	0.002	tr	nd
		Min.							0.004	0.010	0.013	0.008	0.003	0.004	tr	0.001	0.001	0.001	tr	0.001	tr	nd	nd
Nakagusuku Bay Okinawa Pref.	Black porgy	Average										0.012	0.007	0.015	0.011	0.004	0.005	0.005	0.003	0.002	—	—	—
		Max.										0.026	0.013	0.035	0.039	0.005	0.008	0.008	0.006	0.004	0.004	tr	0.002
		Min.										0.004	0.003	0.004	0.003	0.003	0.001	0.002	0.002	0.001	tr	nd	tr
Lake Biwa, Shiga Pref.	Dace	Average						0.016	0.023	0.020	0.014	0.031	0.029	0.014	0.033	0.014	0.014	0.015	0.016	0.008	0.007	0.006	0.006
		Max.						0.026	0.029	0.023	0.017	0.036	0.036	0.016	0.041	0.017	0.023	0.016	0.027	0.011	0.011	0.008	0.007
		Min.						0.012	0.018	0.017	0.012	0.026	0.015	0.012	0.023	0.011	0.010	0.013	0.009	0.003	0.005	0.005	0.005

(Shellfishes)

Yamada Bay, Iwate Pref.	Common mussel	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						0.001	nd	nd	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Miura Peninsula, Kanagawa Pref.	Common mussel	Average						0.009	0.011	0.019	0.009	0.006	0.005	0.005	0.038	0.003	0.002	0.003	0.003	0.002	0.004	0.003	0.002
		Max.						0.010	0.013	0.021	0.010	0.007	0.006	0.005	0.040	0.003	0.002	0.003	0.003	0.002	0.004	0.004	0.003
		Min.						0.009	0.010	0.018	0.009	0.006	0.005	0.004	0.030	0.003	0.002	0.002	0.002	0.002	0.003	0.003	0.002
Noto Peninsula, Ishikawa Pref.	Common mussel	Average						—	0.001	0.002	0.001	0.001	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	0.001	0.002	0.002	0.002	nd	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	0.001	0.002	0.001	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Ise Bay	Common mussel	Average												—	0.004	0.005	0.003	0.002	0.002	0.003	0.002	0.002	0.002
		Max.												0.009	0.005	0.007	0.003	0.002	0.002	0.004	0.002	0.002	0.002
		Min.												0.009	0.004	0.001	0.003	0.002	0.002	0.003	0.001	0.002	0.002
Shimane Peninsula	Common mussel	Average														0.001	—	—	—	0.002	—	—	—
		Max.														0.002	tr	tr	nd	0.002	nd	nd	nd
		Min.														0.001	tr	tr	nd	0.002	nd	nd	nd
Naruto	Asiatic mussel	Average						0.008	0.011	0.014	0.007	0.007	—	0.006	0.011	0.007	0.011	0.005	0.007	0.004	0.003	0.002	—
		Max.						0.008	0.012	0.017	0.010	0.010	0.005	0.010	0.014	0.008	0.013	0.007	0.009	0.005	0.003	0.003	nd
		Min.						0.007	0.008	0.012	0.003	0.004	nd	0.003	0.007	0.004	0.010	0.004	0.004	0.004	0.003	0.002	nd

(Birds)

Suburbs of Morioka Iwate Pref.	Gray starling	Average						—	—	0.001	—	—	—	—	—	—	0.001	—	—	—	—	—	—
		Max.						0.001	0.002	0.002	nd	nd	nd	nd	nd	nd	0.002	0.001	nd	nd	nd	nd	0.001
		Min.						nd	nd	0.001	nd	nd	nd	nd	nd	nd	0.001	nd	nd	nd	nd	nd	nd
Tokyo Bay	Black-tailed gull	Average						0.107	0.166	0.130	0.174	0.318	0.108	0.051	0.058	0.034	0.061	0.043					
		Max.						0.120	0.200	0.150	0.260	0.470	0.130	0.078	0.078	0.046	0.100	0.056					
		Min.						0.094	0.130	0.100	0.120	0.160	0.070	0.027	0.038	0.025	0.045	0.037					
Kabushima	Black-tailed gull	Average																		0.013	0.003	0.002	0.002
		Max.																		0.022	0.003	0.002	0.002
		Min.																		0.007	0.002	0.001	0.002

(Note)　nd : not detected, tr : trace

The sample picking area of Angry rockfish was changed from Offshore of Nemuro Hokkaido to Offshore of Kushiro Hokkaido from the fiscal year 1998.

Table E-8 cis-Nonachlor (Fiscal Year 1978-98)

(Fishes) (Unit: ppm)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Offshore of Kushiro, Hokkaido	Chum salmon	Average Max. Min.						— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd
Offshore of Nemuro, Hokkaido	Angry rockfish	Average Max. Min.						— nd nd	— nd nd	— nd nd	— nd nd	— 0.001 nd	— nd nd	— nd nd	— nd nd	— 0.002 nd	— nd nd	0.002 0.003 0.002	— 0.001 nd	— nd nd	— nd nd	— nd nd	— nd nd
Yamada Bay, Iwate Pref.	Greenling	Average Max. Min.						— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd
Offshore of Joban	Pacific saury	Average Max. Min.						— nd nd	— nd nd	— tr tr	— tr tr	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd
Offshore of Tohoku, Sea of Japan	Cod	Average Max. Min.						— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd
Tokyo Bay	Sea bass	Average Max. Min.						0.004 0.006 0.003	0.004 0.005 0.003	0.006 0.007 0.006	0.004 0.006 0.003	0.009 0.012 0.007	0.004 0.005 0.004	0.017 0.026 0.010	0.003 0.004 0.002	0.005 0.007 0.003	0.004 0.007 0.002	0.006 0.007 0.004	0.002 0.003 0.002	0.001 0.002 0.001	— 0.002 nd	— 0.002 tr	0.003 0.004 0.003
Osaka Bay	Sea bass	Average Max. Min.						0.011 0.013 0.009	0.017 0.027 0.006	0.010 0.012 0.008	0.011 0.014 0.009	0.009 0.015 0.007	0.007 0.009 0.005	0.010 0.012 0.008	0.008 0.010 0.007	0.005 0.013 0.002	0.004 0.004 0.003	0.007 0.009 0.004	0.004 0.006 0.003	0.003 0.004 0.003	0.009 0.015 0.006	0.003 0.003 0.002	0.006 0.006 0.005
Seto Inland Sea	Sea bass	Average Max. Min.						— 0.002 nd	— 0.002 nd	0.004 0.006 0.002	— 0.004 nd	— 0.004 tr	0.007 0.014 0.002	0.006 0.008 0.003			0.003 0.005 0.001	— 0.002 nd	0.002 0.002 0.002	0.003 0.005 0.001	0.006 0.013 0.002	— 0.004 nd	— 0.001 nd
Offshore of Sanin	Sea bass	Average Max. Min.						— 0.009 nd	0.010 0.012 0.008	0.004 0.006 0.003	0.003 0.003 0.002	0.001 0.002 0.001	0.002 0.003 0.001	0.002 0.003 0.002	0.002 0.002 0.002	— nd nd	0.003 0.003 0.002	0.002 0.002 0.002	— tr nd	— 0.001 tr	— tr tr	— tr nd	— nd nd
Mouth of the Riv. Shimanto	Sea bass	Average Max. Min.							— 0.006 nd	0.003 0.006 0.001	0.001 0.002 0.001	0.002 0.002 0.002	— 0.001 tr	— 0.001 tr	0.001 0.002 0.001	— tr nd	— tr tr	— 0.002 nd	— 0.001 tr	— tr tr	— nd nd	— tr nd	— tr nd
Surrouding of Shugen Island	Sea bass	Average Max. Min.													— nd nd	— 0.007 nd	— 0.001 nd	— 0.001 nd	— 0.004 nd	— 0.004 nd	— 0.001 nd	— tr nd	— 0.002 nd
West Coast of Satsuma Peninsula	Sea bass	Average Max. Min.							0.003 0.006 0.001	0.007 0.016 0.003	0.006 0.007 0.005	0.007 0.013 0.004	0.003 0.005 0.002	0.004 0.006 0.002	— 0.002 tr	0.002 0.004 0.001	— tr tr	— 0.001 nd	— nd nd	— tr nd	— nd nd	— nd nd	— tr nd
Nakagusuku Bay Okinawa Pref.	Black porgy	Average Max. Min.										0.004 0.010 0.001	0.003 0.005 0.001	0.005 0.012 0.001	0.003 0.012 0.001	0.001 0.002 0.001	— 0.004 nd	— 0.004 tr	0.002 0.003 0.001	— 0.001 tr	— 0.002 tr	— 0.001 tr	— tr nd
Lake Biwa, Shiga Pref.	Dace	Average Max. Min.						0.008 0.010 0.006	0.008 0.009 0.007	0.008 0.010 0.007	0.006 0.007 0.005	0.009 0.012 0.007	0.012 0.015 0.007	0.006 0.007 0.005	0.016 0.019 0.012	0.009 0.010 0.007	0.011 0.014 0.008	0.011 0.012 0.011	0.003 0.007 0.001	0.005 0.008 0.001	0.004 0.005 0.002	0.004 0.005 0.004	0.002 0.003 0.001

(Shellfishes)

Yamada Bay, Iwate Pref.	Common mussel	Average Max. Min.						— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd
Miura Peninsula, Kanagawa Pref.	Common mussel	Average Max. Min.						0.007 0.008 0.007	0.006 0.006 0.005	0.007 0.008 0.006	0.003 0.003 0.003	0.003 0.004 0.003	0.002 0.003 0.002	0.002 0.002 0.002	0.001 0.001 0.001	0.002 0.002 0.001	0.001 0.001 0.001	0.001 0.001 0.001	0.001 0.002 0.001	0.001 0.001 0.001	— nd nd	0.001 0.001 0.001	0.001 0.001 0.001
Noto Peninsula, Ishikawa Pref.	Common mussel	Average Max. Min.						— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd
Ise Bay	Common mussel	Average Max. Min.												— 0.003 0.003	0.001 0.001 0.001	0.002 0.002 0.001	0.001 0.001 0.001	0.001 0.001 0.001	0.001 0.001 0.001	0.001 0.001 0.001	— 0.001 nd	0.002 0.002 0.002	— nd nd
Shimane Peninsula	Common mussel	Average Max. Min.														— nd nd	— tr nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd
Naruto	Asiatic mussel	Average Max. Min.						0.002 0.003 0.002	0.003 0.003 0.002	0.003 0.004 0.003	0.002 0.003 0.001	— 0.002 nd	— 0.001 nd	— 0.002 nd	0.001 0.002 0.001	— nd nd	0.002 0.003 0.002	— nd nd	0.002 0.003 0.001	— nd nd	— 0.001 nd	— nd nd	— nd nd

(Birds)

Suburbs of Morioka Iwate Pref.	Gray starling	Average Max. Min.						— nd nd	— 0.001 nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd	— nd nd
Tokyo Bay	Black-tailed gull	Average Max. Min.						0.029 0.036 0.024	0.041 0.057 0.035	0.038 0.054 0.027	0.050 0.080 0.030	0.065 0.110 0.033	0.040 0.050 0.025	0.012 0.028 0.006	0.020 0.027 0.013	0.012 0.016 0.010	0.027 0.054 0.017	0.016 0.023 0.011					
Kabushima	Black-tailed gull	Average Max. Min.																		— 0.003 nd	— 0.001 nd	— nd nd	— nd nd

(Note) nd : not detected, tr : trace

The sample picking area of Angry rockfish was changed from Offshore of Nemuro Hokkaido to Offshore of Kushiro Hokkaido from the fiscal year 1998.

Table E-9 Oxychlordane (Fiscal Year 1978-98)

(Fishes) (Unit: ppm)

Sampling spot	Species	Classification	'78	'79	'80	'81	'82	'83	'84	'85	'86	'87	'88	'89	'90	'91	'92	'93	'94	'95	'96	'97	'98
Offshore of Kushiro, Hokkaido	Chum salmon	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Nemuro, Hokkaido	Angry rockfish	Average						—	—	—	—	—	—	—	—	—	—	0.003	—	—	—	—	—
		Max.						nd	nd	nd	nd	0.001	nd	0.001	nd	0.001	nd	0.004	0.001	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	0.002	nd	nd	nd	nd	nd
Yamada Bay, Iwate Pref.	Greenling	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Joban	Pacific saury	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	tr	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Offshore of Tohoku, Sea of Japan	Cod	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Tokyo Bay	Sea bass	Average						0.001	0.001	0.002	—	0.002	—	0.001	—	—	—	—	—	—	—	—	—
		Max.						0.002	0.001	0.002	0.002	0.002	0.001	0.003	nd	0.002	0.001	0.001	nd	nd	0.002	nd	nd
		Min.						0.001	0.001	0.001	tr	0.001	nd	0.001	nd	nd	nd	nd	nd	nd	nd	nd	nd
Osaka Bay	Sea bass	Average						0.003	0.005	0.003	0.004	0.002	0.001	0.002	0.002	—	—	0.001	0.001	—	0.002	—	0.001
		Max.						0.004	0.007	0.004	0.004	0.003	0.002	0.002	0.002	0.001	0.001	0.001	0.001	tr	0.009	nd	0.001
		Min.						0.003	0.002	0.003	0.003	0.001	0.001	0.002	0.002	tr	nd	0.001	0.001	tr	0.001	nd	0.001
Seto Inland Sea	Sea bass	Average						—	—	0.001	—	—	—	—			—	—	—	—	—	—	—
		Max.						nd	0.002	0.002	nd	tr	0.002	0.002			nd	nd	nd	0.002	0.002	0.002	nd
		Min.						nd	nd	0.001	nd	nd	tr	nd			nd	nd	nd	nd	nd	nd	nd
Offshore of Sanin	Sea bass	Average						—	0.002	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						0.002	0.003	0.002	0.002	nd	nd	nd	nd	nd	nd	nd	nd	nd	tr	tr	tr
		Min.						nd	0.002	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	tr	tr	tr
Mouth of the Riv. Shimanto	Sea bass	Average							—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.							nd	0.002	0.001	0.001	tr	tr	tr	tr	tr	nd	tr	tr	nd	tr	nd
		Min.							nd	nd	tr	tr	tr	nd	tr	nd	nd	nd	nd	tr	nd	nd	nd
Surrouding of Shugen Island	Sea bass	Average													—	—	—	—	—	—	—	—	—
		Max.													nd	0.003	nd	nd	nd	nd	nd	nd	nd
		Min.													nd	nd	nd	nd	nd	nd	nd	nd	nd
West Coast of Satsuma Peninsula	Sea bass	Average							—	0.003	0.004	0.002	—	—	—	—	—	—	—	—	—	—	—
		Max.							0.001	0.005	0.005	0.004	0.001	0.002	0.001	nd	nd	nd	nd	nd	nd	nd	nd
		Min.							tr	0.001	0.003	0.001	tr	tr	nd	nd	nd	nd	nd	nd	nd	nd	nd
Nakagusuku Bay Okinawa Pref.	Black porgy	Average										0.006	—	0.004	0.003	0.001	—	—	—	—	—	—	—
		Max.										0.013	0.006	0.005	0.007	0.002	0.003	0.002	0.002	0.002	0.001	tr	tr
		Min.										0.002	tr	0.001	0.001	0.001	nd	tr	tr	nd	tr	tr	nd
Lake Biwa, Shiga Pref.	Dace	Average						0.002	0.003	—	0.001	0.002	0.003	0.002	0.003	0.003	0.001	—	—	—	—	—	—
		Max.						0.003	0.003	0.002	0.001	0.004	0.003	0.002	0.004	0.004	0.002	0.002	nd	nd	nd	nd	nd
		Min.						0.001	0.002	nd	0.001	0.001	0.003	0.002	0.002	0.003	0.001	nd	nd	nd	nd	nd	nd

(Shellfishes)

Yamada Bay, Iwate Pref.	Common mussel	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Miura Peninsula, Kanagawa Pref.	Common mussel	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Noto Peninsula, Ishikawa Pref.	Common mussel	Average						—	—	—	—	—	—	—	—	—	—	—	—	—	—	—	—
		Max.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.						nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd	nd
Ise Bay	Common mussel	Average												—	—	—	—	—	—	—	—	—	—
		Max.												tr	nd	nd	nd	nd	nd	nd	nd	nd	nd
		Min.												tr	nd	nd	nd	nd	nd	nd	nd	nd	nd
Shimane Peninsula	Common mussel	Average														0.001	—	—	—	—	—	—	—
		Max.														0.001	tr	nd	nd	nd	nd	nd	nd
		Min.														0.001	tr	nd	nd	nd	nd	nd	nd
Naruto	Asiatic mussel	Average						0.004	0.005	0.007	—	0.004	—	—	0.005	0.004	0.010	0.006	0.009	0.006	0.004	0.003	0.003
		Max.						0.004	0.005	0.008	0.006	0.006	0.002	0.004	0.006	0.006	0.011	0.007	0.016	0.007	0.004	0.004	0.003
		Min.						0.003	0.005	0.005	nd	0.002	nd	nd	0.004	0.003	0.008	0.005	0.006	0.005	0.004	0.003	0.002

(Birds)

Suburbs of Morioka Iwate Pref.	Gray starling	Average						—	0.002	0.001	—	—	—	—	—	—	0.002	0.002	—	—	—	—	—
		Max.						0.002	0.002	0.002	0.001	nd	nd	0.001	nd	0.002	0.003	0.002	nd	nd	nd	nd	0.001
		Min.						nd	0.001	0.001	nd	nd	nd	nd	nd	nd	0.002	0.002	nd	nd	nd	nd	nd
Tokyo Bay	Black-tailed gull	Average						0.036	0.038	0.034	0.041	0.055	0.030	0.018	0.014	0.010	0.015	0.013					
		Max.						0.049	0.049	0.046	0.055	0.079	0.040	0.023	0.018	0.014	0.019	0.016					
		Min.						0.029	0.023	0.021	0.035	0.030	0.014	0.013	0.011	0.008	0.011	0.012					
Kabushima	Black-tailed gull	Average																		0.006	0.002	—	—
		Max.																		0.011	0.002	nd	nd
		Min.																		0.003	0.001	nd	nd

(Note) nd : not detected, tr : trace

The sample picking area of Angry rockfish was changed from Offshore of Nemuro Hokkaido to Offshore of Kushiro Hokkaido from the fiscal year 1998.